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BRITISH ARMY AND COLONIAL FORTIFICATIONS IN NORTH TARANAKI, 1863–64

NIGEL PRICKETT

Abstract. British Army and colonial fortifications in north Taranaki in the years after 1863 tell directly of the course and success of European military strategy in the region. The purpose of most fortifications of the period was to defend the expanding frontier of settlement, and give security to farmers who were returning to their farms or taking up confiscated land. The taking of Maori land and its settlement by men who enlisted for service in the province as Taranaki Military Settlers achieved the Pakeha objective of more land, and at the same time denied Maori the means of continuing the struggle. Twenty-one redoubts, stockades and blockhouses of the years 1863–64 are described in historical narrative order.

The March 1861 truce at the end of the First Taranaki War saw Maori forces in possession of 4000 acres of European farmland at Tataraimaka, while British troops held land at Waitara for which Pakeha had gone to war. A British Army garrison made up of detachments of the 57th Regiment stayed on in the isolated west coast province, supported by local militia and volunteer corps. The issues over which the war was fought were, however, quite unresolved. For European settlers – and Maori – everything revolved around the question of land.

The Second Taranaki War was initiated by Governor George Grey in autumn 1863, to resolve loose ends of the earlier campaign, and protect New Plymouth against a perceived threat from southern tribes. Grey wished to extricate himself from Waitara, but at the same time, to maintain good relations with the settler community, he determined to reoccupy Tataraimaka. When he sent troops back to the southern block before giving up Waitara a party of soldiers was ambushed by Maori on the beach road to the outlying district, and so fighting began in Taranaki which was to continue intermittently for several years.

The reoccupation of Tataraimaka took place in April 1863, three months before British troops crossed the Mangatawhiri River to begin the decisive Waikato War. The Second Taranaki War thus took place at the same time as the Waikato campaign which ended at Orakau in April 1864, also the Tauranga Campaign of 1864, the Wanganui campaigns of 1865 and 1866, and fighting on the East Coast in 1865. In Taranaki the fighting which began with Grey's move of autumn 1863 drifted to a close in spring 1866 in bush country near Opunake.

Whereas the 1860–61 campaign arose out of particular and limited settler ambition, the Second Taranaki War of 1863–66 became the instrument of a deliberate policy of expansion of European settlement according to the New Zealand Settlements Act. This November 1863 legislation of the settler parliament allowed confiscation of the whole of any district where a "considerable number" of Maoris were in rebellion against the Crown. The war in Taranaki was fought not just to bring about the defeat of Maori forces but to secure land for European settlement – and by taking their land, destroy any ability of Maori to continue the unequal struggle.

Most of the fortifications introduced in the following pages were frontier posts located to secure confiscated land for European settlement (Fig. 1). Other posts protected lines of communication north and south of New Plymouth. All were strategic in nature, unlike the tactical works of the 1860–61 campaign (Prickett 1994a). The works are presented in chronological order, which serves also to outline the course of campaigning. It is planned to

deal in a later publication with fortifications of the period 1865–69. Map references and New Zealand Archaeological Association site record numbers for all sites are given in Appendix 1.

OPENING MOVES

ST PATRICK'S (POUTOKO) REDOUBT

Renewed fighting in Taranaki dates from autumn 1863. On 6 April Lieutenant General Cameron reported to the War Office in London as follows:

"I have the honour to inform that on the 2nd March I proceeded to New Plymouth in H.M.S. "Harrier," in company with his Excellency Sir George Grey, with the view of taking measures for the protection of the Settlement against the Taranaki and Ngatiranni [sic, Ngati Ruanui] tribes, whose continued hostility since the war has prevented the settlers from returning to their farms, except in the immediate vicinity of the town."

The first movement in what was to be a protracted conflict was the establishment of a large redoubt within the southern boundary of the Omata Block. While the 1860 Waireka Camp (see Prickett 1994:41–43) was situated on the northern flank of the high ground extending here to the coast, and so overlooked country back to New Plymouth, the new work was high on the south side of the ridge and overlooked a wide area south and west. Except for the outlying Tataraimaka Block this country was in Maori ownership at the beginning of the decade. The new redoubt symbolises nicely the outward thrust of European ambition and strategy in Taranaki's second war.

“On Thursday Morning [March 12] at 8.30 o'clock, 300 of the 57th Regt. under Colonel Warre, C.B, Captains Woodall, and Gorton, Lieuts. Brutton, Thompson, Tragett, and Waller, Adjutant Clarke, and Asst. Surgeon Hope, together with Lieut. Ferguson and a detachment of the Royal Engineers, paraded under Mt Eliot and marched off by the Great South Road towards Omata, preceded by several carts laden with baggage and camp equipage in charge of Lieut. Cox, 57th Regt. His Excellency Sir George Grey, General Cameron, and suite, followed. The troops reached Waireka at 10 o'clock and encamped on Wilkinson's farm, near the southern boundary of the Omata block, where a stockade is to be erected.”

(*Taranaki Herald* 14 Mar 1863)

The redoubt was completed and occupied on March 20 (*Taranaki Herald* 21 Mar 1863; Warre 1878:166 says the 24th). It was called 'St Patrick's Redoubt', or 'Poutoko' after a small Maori settlement on high ground seaward of today's Plymouth Road. On 1 April it was occupied by seven officers and 220 non-commissioned officers and men, 57th Regiment (War Office 0270.I: App. V). It was the first redoubt built under the supervision of Lieutenant Charles Ferguson R.E. who was later responsible for the design and construction of many Taranaki works.

Throughout 1863 St Patrick's Redoubt was occupied by troops of the 57th and 70th Regiments and briefly, during the absence of the 57th at Katikara River early in June, by the 40th (War Office 0270.I:35–36). When the 70th were sent to the Waikato in spring, nearby St Andrew's Redoubt (see below) was abandoned, its 57th Regiment garrison replacing the 70th at St Patrick's Redoubt (NP Garrison Quarter Master Letter Book 28 Aug 1863).

On 2 October 1863 a Maori force approached St Patrick's Redoubt from Kaitake and a fight took place at Allen's Hill 1.5 km south (see AJHR 1863 E–5:40–43). The troops soon pulled back from the bush edge held by the enemy. Ensign Down and Drummer Stagpoole, both of the 57th, won Victoria Crosses for bringing out a wounded soldier under heavy fire. Antonio Rodriguez of the Taranaki Mounted Volunteers gained the rare New Zealand Cross. At this time the redoubt was under the command of Captain A.B. Wright, 70th. After the fight Fort Robert was established not far from St Patrick's Redoubt to provide support (see below).

At the end of 1863 there were 150 militia at St Patrick's as well as troops (NP Garrison Office Letter Book 22 Dec 1863). The garrison and volunteer force at Fort Robert were under command of the senior regular officer at St Patrick's – in January 1864, Captain Shortt, 57th (NP Garrison Office Letter Book 20 Jan 1864). When Oakura was reoccupied in early March 1864 the troops abandoned St Patrick's to 100 militia under Captain Carthew (NP Garrison Quarter Master Letter Book 2 Mar 1864). On 1 August 1864 the post was still held by 250 local men (Taranaki Militia and Volunteers Letter Book 1 Aug 1864).

St Patrick's Redoubt was less important with an end to the threat from Maori positions in the Kaitake Ranges in March 1864 and the establishment of military posts further south. In spring 1864 Poutoko Blockhouse (see below) was built nearby to replace the old redoubt, one face of which was thrown down at the time.

A watercolour by Colonel Warre shows the troops' camp during construction of the redoubt (Fig 2.). There are also pictures by Warre of the palisaded Maori kainga 'Poutoko', situated on high ground just outside the Omata Block boundary.

St Patrick's Redoubt was situated within the major bend of South Road between Hurford and Plymouth Roads. It shows up well on an aerial photograph taken in August 1950 (Fig. 3). At this stage the work was still largely intact, although the west and east parapets had sustained damage. The signs of soldiers' huts can be seen, dug into the south facing slopes of the gully behind the redoubt. Photographs of the earthworks taken in the 1950s by Omata resident Len Jury are also an important record (Figs 4 and 5). The redoubt was completely destroyed when the present house was built on the site in the late 1950s.

From the aerial photograph St Patrick's can be established as an off-square work, *ca* 42 x 50 m, with flanking defence on all four corners in the so-called 'New Zealand style' (Young 1869:12). The entrance was through the north-east side (Fig. 6).

ST GEORGE'S (TATARAIMAKA) REDOUBT

After the establishment of St Patrick's Redoubt Cameron went back to Auckland for reinforcements, which were to include 400 of the 65th and 70th Regiments, and Captain Mercer's Royal Artillery battery of 100 men who were given horses to make up a mounted



Fig. 2. Colonel H.J. Warre "Camp at Poutoko" (Hocken Library, Dunedin), showing the troops' encampment during construction of St Patrick's Redoubt, April 1863.



Fig. 3. Aerial view of St Patrick's Redoubt, 14 August 1950 (NZ Aerial Mapping 1787/5).

force and equipped with swords, revolvers and carbines. Cameron then returned to Taranaki, to reoccupy Tataraimaka – which he had first proposed in 1861 but which had since been claimed by Taranaki and Ngati Ruanui “...as belonging to them by right of conquest” (WO 0270.II).

The troops returned to Tataraimaka on 4 April 1863.

“The force consisted of 200 men of the 57th, under Colonel Warre, C.B., Capt. Woodall, Lieuts. Brutton, Thompson, Tragett, Cox, Waller, Lieut. and Adjut. Clarke, and Asst.-Surgeon Hope; also 100 Royal Artillery as a mounted corps, with two guns, under Capt. Mercer, R.A., and Lieuts. Rait and Pickard, R.A., together with 6 of the Royal Engineers, under Major Mould, R.E. His Excellency the Governor, Lieut.-General Cameron, C.B., and Staff, the hon. Mr. Domett, Colonial Secretary, the hon. Mr. Bell, Native Minister, and Mr. Parris, Asst. Native Secretary, and suite, arrived from town at the redoubt [St Patrick's] at 9.30, and soon after their arrival the force moved southwards; the detachment of the 70th, under Major Mulock, from Mace's farm occupying the redoubt vacated by the 57th.”

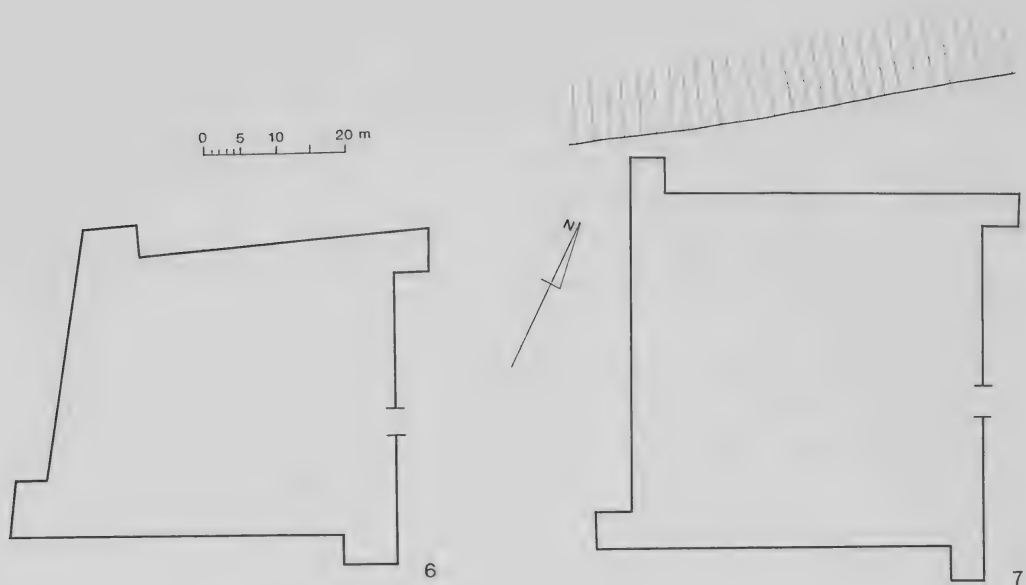
(Taranaki Herald 11 Apr 1863)



Fig. 4. View across the interior of St Patrick's Redoubt to north, taken in the 1950s by Len Jury, Omata.



Fig. 5. St Patrick's Redoubt defensive ditch, north-east side, 1950s photograph by Len Jury, Omata.



Figs 6–7. Redoubt plans. 6. St Patrick's Redoubt drawn from the 1950 aerial photograph. 7. St George's Redoubt.

The undefended camp at Mace's farm was located at Whaler's Gate near the corner of Barrett and Omata Roads. It was occupied briefly before the advance on Tataraimaka.

On the night of the 4th the force camped on MacDonald's farm, Tataraimaka, between Greenwood and Lower Timaru Roads. The following day the troops moved on to Bayly's farm at the seaward end of Pitone Road where work began on a new redoubt. Two hundred men completed 268 yards of parapet in four days. The work was completed and occupied on the morning of the 13th (War Office 0270.I: App. V). By 18 April only the 57th remained at Tataraimaka.

"At Tataraimaka, the 57th have completed the redoubt on Bayly's farm, (named St. George's Redoubt) and have constructed another on the site of an old Maori pa, which is called Mount Tataraimaka, – a strong natural position on a small promontory which commands the first named redoubt. The utmost vigilance is maintained at these redoubts, now under the command of Major Logan, 57th Regiment, recently from Wanganui."

(*Taranaki Herald* 18 Apr 1863)

On 4 May 1863 a party of soldiers travelling from St George's Redoubt to New Plymouth was attacked by Maori on the Oakura Beach near the mouth of Wairau Stream (Cowan 1922–23 I:216–218). Only one man escaped the ambush which contemporary reports refer to as the 'Hope–Tragett Ambush' (after the two officers killed) or, curiously enough, the 'Wairau Massacre' (*Taranaki Herald* 16 May 1863). This was the first engagement of the Second Taranaki War. Grey's tardiness in giving up the Waitara was reaping its reward. To make safe the road St Andrew's Redoubt was thrown up overlooking the north end of Oakura Beach.

On 4 June the 57th at St George's Redoubt were joined by troops of the 65th and 70th Regiments and Royal Artillery for an attack on Porou, a fortified pa on the terrace country south of Katikara River. Cameron was in command, and Governor Grey watched from the *Eclipse* anchored offshore. The Taranaki and allied forces were driven from their position losing 28 dead (see AJHR 1863 E-5:1-5 for the reports). The pa was located on a slight but commanding mound where in the 1970s infilled earthworks could be traced over an area *ca* 50 x 50 m (map reference P19 863287). A lively sketch of the attack on the pa is to be found on page 75 in the Warre Sketchbook, Hocken Library.

When troops were shifted to Auckland in winter for the Waikato campaign only the 57th and one company of the 70th remained in Taranaki. It was decided therefore that St George's Redoubt would be given up. This was carried out the last day of June. Everything of value was brought away or burnt, and the redoubt left standing (*Taranaki Herald* 4 Jul 1863). It was to be 18 months before European forces returned to Tataraimaka.

In March 1864 Colonel Warre visited the abandoned redoubt in the course of operations against Maori positions on the flanks of the Kaitake Ranges.

"On Tuesday the 22nd after having destroyed the Tutu pah I visited St Georges Redoubt which remains in nearly the same state as when evacuated by the troops in July last. The Maoris not having taken the Trouble to destroy the Parapets or even the Stockade facing the sea."

(NP Garrison Quarter Master Letter Book 1 Apr 1864)

On 18 April 1864 150 of the 57th, together with mounted men and Bushrangers, Volunteers and Military Settlers, 500 men in all, under command of Major Butler, 57th, marched south from New Plymouth. On the 19th they reached St George's Redoubt where 100 men were left, made up of Captain Schomberg with some of the 57th and Captain Brassey's military settlers (*Taranaki Herald* 23 Apr 1864). The main force went on to destroy Maori property south of Stoney River, returning to Tataraimaka on the evening of the 20th. Next day the force returned to town and the post was again left empty.

St George's Redoubt was reoccupied for the last time at the end of 1864. On 28 November Colonel Warre wrote the the Deputy Quarter Master General, Auckland,

"I have the honour to report for the information of the Lieut General Comg that Tataraimaka was reoccupied by a detach 43rd L. Infy under Major Colvile 43 L.I. on the 24th inst. The Redoubt was partially destroyed, but a few days work will restore it to its former state."

(NP Garrison Quarter Master Letter Book)

The 43rd detachment was 285 strong, including 250 rank and file.

The redoubt lost importance as the war moved south. In January 1865 much of the garrison marched forward to the Stoney River frontier (*Taranaki Herald* 28 Jan 1865). A month later the garrison was down to 114 of the 43rd (NP Garrison Quarter Master Letter Book 18 Feb 1865). On 31 May 1865 there remained just 52 of the 43rd, 19 Military Settlers and 15 Taranaki Militia (AJHR 1865 A-5:63-64). In October the 43rd at Tataraimaka were reduced to one sergeant, one bugler and 17 rank and file (NP Garrison Order Book 25 Oct 1865). The redoubt was finally abandoned on 18 April 1866 (NP Garrison Order Book 17 April 1866).

St George's Redoubt was situated on the seaward terrace edge south of Lower Pitone Road, where a notice draws attention to the redoubt and the common grave of Maori killed on 4 June 1863. The notice names 'Fort St George', a term not used at the time. The summit

For cultural reasons, this image has been removed.
Please contact Auckland Museum for more information.

Fig. 8. G.W. Norbury, 'The Fight of Kaitake, one Mile South of Tataraimaka. 4th June 1863' (Alexander Turnbull Library, Wellington). In the left foreground are tents, signal mast and defensive parapet of the 'Crow's Nest' on top of Tataraimaka pa. In St George's Redoubt three rows of tents leave a clear area behind the forward (far) parapet. Outside smoke rises from a cookhouse. Troops are advancing on the pa – on the skyline right of the flagpole. The *Eclipse* is offshore. The artist was a soldier in the 70th Regiment.

of nearby Tataraimaka pa which was used as a military signal station is still known by the soldiers' name – the 'Crows Nest'.

A watercolour by G.W. Norbury, 70th Regiment, shows the attack of June 1863 from the 'Crows Nest' with the redoubt in the foreground (Fig. 8). The work is of typical rectangular plan with flanking defence at each corner to cover all sides. It is also pictured in a watercolour by Robert Greenwood, held in the Taranaki Museum (Fig. 9). Neither picture confirms Colonel Warre's "stockade facing the sea", which may date from after the sketches were made.

The redoubt lies outside the present reserve, on the other side of a boxthorn hedge (Fig. 10). Although largely destroyed by cultivation over the years, historical and archaeological information combine to give its shape and size. Colonel Gamble says the parapet was 268 yards (245 m) in length (War Office 0270 .I). Archaeological evidence indicates a work approximately 60 m square with signs of flanking defence on the inland angles, and at the south-west corner covering the seaward face (Fig. 7). The latter angle, close to the steep scarp to the sea, is supported by beach boulders which may still be seen. The fourth angle, visible in the Norbury picture, is now beneath the hedge.

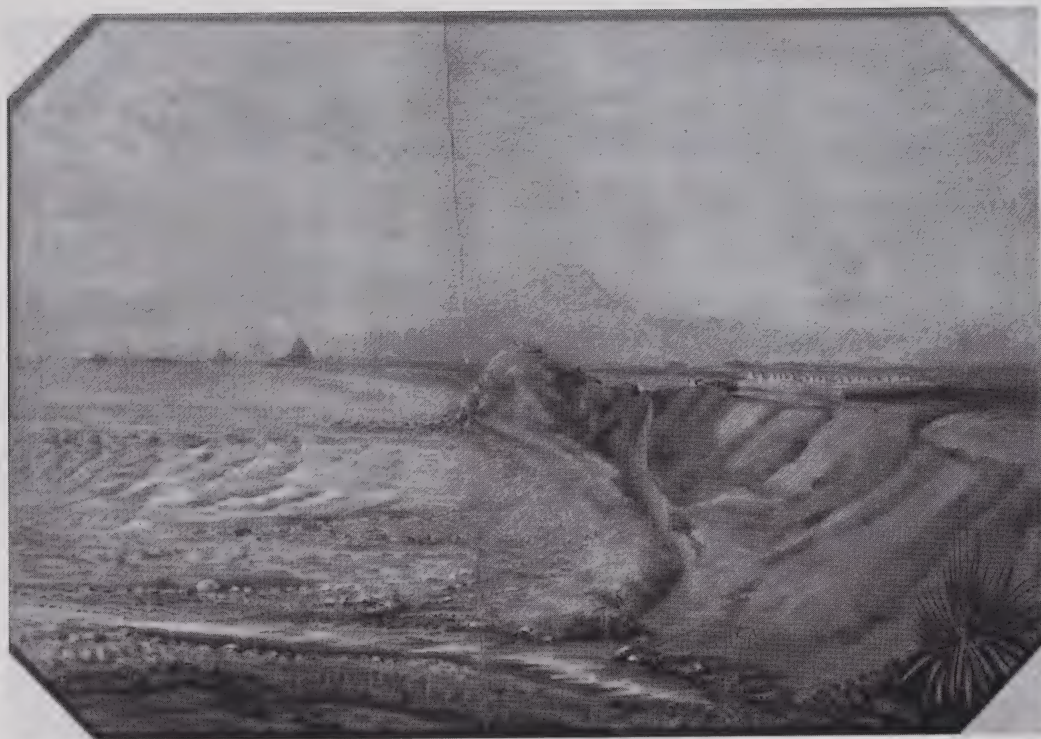


Fig. 9. St George's Redoubt and 'Crow's Nest'. (Robert Greenwood, Taranaki Museum, New Plymouth).

There is a suggestion that the seaward face was originally unflanked. Colonel Gamble writes,

"A small work for thirty men was also thrown up on a cliff overhanging the sea, and partly commanding the redoubt, of which it partly enfilades the sea face, the only one left unflanked in the construction of the work."

(War Office 0270.I: App. V)

The Greenwood sketch offers difficult confirmation of this point. The Norbury picture, however, shows that one month after its establishment the redoubt is fully flanked. Excavation might throw light on these alterations.

The earth breastwork which surrounded the signal station is no longer visible, the platform on top of the old pa offers no surface indication of its military use. Two tents, a signal mast and breastwork are shown at bottom left in the Norbury picture, and can also be seen in the Greenwood watercolour.

ST ANDREW'S (OAKURA) REDOUBT

Work on St Andrew's Redoubt began on 5 May 1863, the day after the ambush on Oakura Beach. The new work was located on the high terrace north of the Oakura River mouth,



Fig. 10. A 1975 aerial photograph reveals the ploughed remains of St George's Redoubt. On the headland are the remains of Tataraimaka pa and the 'Crow's Nest' signal station.

overlooking the scene of the ambush. Soldiers of the 57th and 70th were employed, under the command of Major Logan, 57th. The redoubt was completed in about a week (*Taranaki Herald* 8 and 16 May 1863).

St Andrew's Redoubt was occupied at the end of May by 150 of the 57th (War Office 0270.I:33), reinforced by 50 of the 70th on 1 June (War Office 0270.I:36), and a further 50 of the same regiment on 9 June (War Office 0270.I:39). The redoubt was abandoned when the 70th were transferred to Waikato in August.

"On the 11 August the Troops were withdrawn from the Oakura Redoubt at noon, the whole of the stores, Camp Equipage, Ammunition, Signal mast, and Howitzer being removed to Poutoko by the carts in Two trips."

(NP Garrison Quarter Master Letter Book 16 Aug 1863)

On 15 September 1863 troops from Poutoko made use of the abandoned redoubt in carrying out an ambush nearby, Captain Russell leaving a small part of his force there to secure his return (GBPP [3277]:77). In October about 60 Maori were reported to be pulling down the unoccupied earthwork (GBPP [3277]:91).

St Andrew's Redoubt was reoccupied on 1 March 1864, after the death of a Mr Pattison at the hands of Maori from the Kaitake Ranges two days before. But Colonel Warre had already been planning the move, for reasons similar to his occupation of Mahoetahi and Sentry Hill shortly before (AD1, 64/363). Although most European forces were committed in the Waikato, resources for an aggressive policy were again becoming available in Taranaki, in particular the increasing numbers of Taranaki Military Settlers. Warre wanted these men established in quarters before winter, out of New Plymouth which had been a "...pandemonium of Drunkenness since their arrival" (AD1, 64/1058).

A 2 March 1864 letter from Warre to the Deputy Quarter Master General, Auckland, outlines the disposition of troops in Taranaki at this time.

"In reference to my letter of the 29th Ultimo [February] I have the honor to report for the information of the Lieut General Commg. that in Consequence of the murder of Mr Pattison I have re-occupied the old position at Oakura – & the Troops and Militia are now employed in rebuilding the Redoubt which had been partially destroyed by the Rebel Maoris, who made no attempt at opposing the advance of the Troops

Oakura About 100 of the 57th under Capt Lloyd
 About 150 Mily Settlers under Capt Page

Fort Robert and 120 Militia under
 Parhetiri [sic] on Capt. Corbett
 the Tapuae River

Poutoko– 100 Militia under Capt Carthew

Omata– 80 Militia under Capt McKellar

The remainder of the Militia and Military Settlers occupy the Blockhouses surrounding the Town – the Town itself – and about 60 at Bell Block Stockade.

Captain Shortt's Company 57th Regiment occupies Sentry Hill with about the same number of men (60) under Lieut Mills at Mahoitahi [sic] under Canvas and in the Blockhouse."

(NP Garrison Quarter Master Letter Book)

St Andrew's Redoubt became the central forward post for the southern front until the further advance of summer 1864–65. Colonel Warre, in a letter to the Defence Minister, Auckland, dated 27 April 1864, writes,

"It is proposed to establish a Central Depot at Oakura (St Andrew's Redoubt) where (100) one hundred regular Infantry are stationed for the supply of all posts south of the Tapuae River – and at the St Andrews Redoubt should be established a Militia Field Hospital, Field Magazine and Stores for the supply of such articles as must be required and which it is difficult to convey during the Winter Mos."

(NP Garrison Quarter Master Letter Book)

In May work was begun on barrack buildings at the post, which were probably completed about the end of July (NP Garrison Quarter Master Letter Book 13 Jul 1864). A signal station was established on 26 March after Kaitake pa was taken in the ranges overlooking the redoubt (NP Garrison Quarter Master Letter Book 3 Apr 1864).

On 31 May 1865 the garrison at St Andrew's Redoubt was made up of three Royal Artillery, one captain, one subaltern, two sergeants and 27 rank and file, 43rd Light Infantry,

15 rank and file, Commissariat and Transport Corps, and one man each from the 57th and 70th Regiments, a total of 67 (AJHR 1865 A-5:63-64). By October there was only one sergeant, a bugler and 17 rank and file, 43rd (NP Garrison Order Book 25 Oct 1865). The position was finally abandoned when the 50th Regiment garrison marched forward to Stoney River on 6 December 1866 (NP Garrison Order Book 5 Dec 1866).

Two informative photographs of St Andrew's are to be found in Volume 2 of the Nicholl Albums, held in the Alexander Turnbull Library, Wellington (Figs 11 and 12). Lieutenant Spencer Nicholl, served in New Zealand with the 43rd Light Infantry, was wounded at Gate Pa, and was in Taranaki in the summer of 1864-65. The pictures were taken in December 1864 or early 1865, after blockhouses were put up at the redoubt. The 43rd is in residence.

A lithograph of the redoubt in Colonel Alexander's *Bush Fighting* (1873:opp. p. 26) is based on an original sketch by Colonel Warre – dated prior to March 1864 as Kaitake is still in Maori hands. In the Warre Sketchbook, Hocken Library, Dunedin, is a pencil, pen and wash sketch of the site dated 20 April 1863, that is, two weeks before the redoubt was established, showing two Maori whare there at the time.

St Andrew's Redoubt is situated on the terrace above Corbett Park on the north bank of the Oakura River. It is an off-square work of irregular sides (maximum length 45 m, minimum, 29 m), with flanking defence at all four corners – that is, in the 'New Zealand' style (Fig. 14). The work is on a slight eminence above the general level of the terrace. The trig 'Oakura' on the north-west corner of the redoubt wall is 43.6 m above sea level. Three levels



Fig. 11. Camp at St Andrew's Redoubt, Oakura, December 1864 or early 1865. A general view of the undefended area, looking south to the redoubt which is obscured by the buildings and raupo whare on the left. Beyond the tents a parapet runs along the top of the scarp above the Oakura River valley. (Volume 2, Nicholl Albums, Alexander Turnbull Library, Wellington).



Fig. 12. St Andrew's Redoubt. The camera has been set up beyond the small shed in the left foreground of Figure 11, to show the redoubt with tents, signal mast and large raupo-roofed huts within. A causeway with handrail leads to the gateway. In the foreground cooking is going on over an open fire. (Volume 2, Nicholl Albums, Alexander Turnbull Library, Wellington).

inside the redoubt are separated by slight steps. The ditch around the work averages 8 m from the top of the wall to the outer edge; a causeway crosses to an entrance in the north-east wall.

East of the redoubt a 50 m long parapet tops the terrace edge (Fig. 13). Cart ruts can be seen running across the terrace to the seaward end of the parapet where the old road descended to the beach down the narrow spur on the seaward side of Corbett Park. It left the beach again south of Timaru River. Depressions mark the sites of semi-subterranean accommodation huts shown in the Nicholl photographs. The ragged trench parallel to the cart ruts will also be the result of traffic to the top of the descent to the beach.

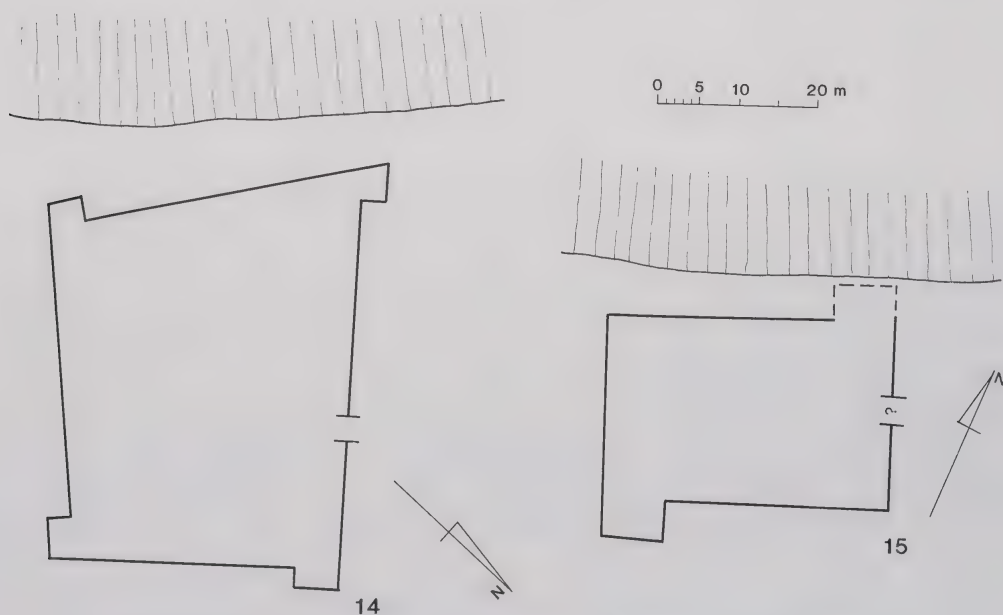
The site is in good condition with earth walls protected by gorse growing on top. Where the gorse has gone walls have suffered from erosion and stock damage. The redoubt interior has apparently been used in the past as a vegetable garden. The paddock outside appears never to have been ploughed.

FORT ROBERT

Fort Robert dates from the fight at Allen's Hill on 2 October 1863. The new work was thrown up on high ground seaward of the present junction of Plymouth and South Roads. A pa or kainga named Rangiuru once occupied the hilltop site (Wairau I and II blocksheet 45/2, DOSLI, New Plymouth; the settlement is depicted in the Hocken Library Warre Sketchbook, p. 53). Fort Robert was named after Ropata Ngarongamate of Poutoko, a leading Maori ally of the European settlers and military forces (Skinner 1935:6).



Fig. 13. St Andrew's Redoubt, 1975. Outside the offsquare work can be seen depressions which mark dug-in soldiers' huts (see Figs 11 and 12), and the cart road which led to a steep descent to Oakura Beach.



Figs 14–15. Redoubt plans. 14. St Andrew's Redoubt. 15. Fort Robert.

As well as providing flanking defence for St Patrick's Redoubt, the new post was established, "with a view to ... further advance as soon as circumstances admit" (NP Garrison Quarter Master Letter Book 10 Oct 1863). Fort Robert was occupied only by local forces, Colonel Gamble (War Office 0270.1:59) reporting that one of the reasons for its establishment was so that the newly arrived Otago contingent of Taranaki Military Settlers might "cultivate with safety".

"On Wednesday [7 October] 50 men of the Volunteer Militia, under Capt. J.G. Corbett and Ensign J. Kelly, marched to the front, and now garrison Fort Robert, a redoubt to seaward of the abandoned native village at Poutoko, and which overlooks the Tapuae and Oakura blocks."

(*Taranaki Herald* 10 Oct 1863)

The garrison was reinforced on 13 October by one officer and 24 men of the Taranaki Military Settlers (NP Garrison Quarter Master Letter Book 17 Oct 1863). In March 1864 Captain Corbett's company was divided between Fort Robert and the new redoubt at Pahitere (NP Garrison Quarter Master Letter Book 2 Mar 1864). It is likely the July withdrawal of men to St Patrick's Redoubt and establishment of a new blockhouse at Allen's Hill marks the abandonment of Fort Robert (NP Garrison Quarter Master Letter Book 18 Jul 1864).

A sketch by Lieutenant Colonel E.A. Williams shows a corner of the Fort Robert defences with an earth flanking angle and palisaded wall (Fig. 16). Soldiers' washing, a dovecote and a flagpole can be seen. A small hut is set into the hillside below the two figures. The location of some huts can be seen in the 1950 aerial photograph (1787/5, 14 Aug 1950, NZ Aerial Mapping; Fig. 17), but these are indistinct on the ground today.

The redoubt is situated on top of the hill with the trig 'Poutoko A', 97.5 m above sea level, at one angle. It measures *ca* 23 x 35 m, and appears from the 1950 aerial photograph to have had flanking defence at two angles to cover only the two long sides (Fig. 15). Only one of these 5 x 7.5 m bastions is now apparent. The site has been largely destroyed by cultivation, most damage occurring after the 1950 aerial photograph was taken.

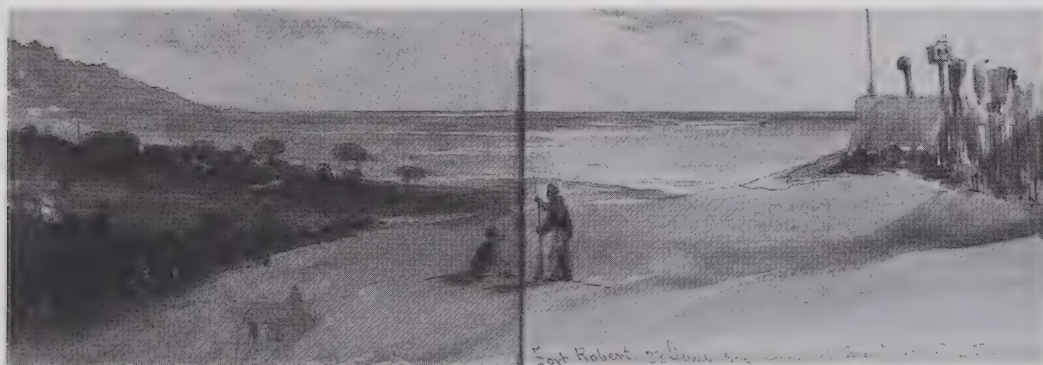


Fig. 16. "Fort Robert. 28 June 1864. Coast of New Zealand – Taranaki". (E.A. Williams Sketchbook, Hocken Library, Dunedin). Earthwork and stockade can be seen. At left is a soldiers' hut, typically dug into a nearby hillside. Beyond is the great sweep of the Taranaki coast.



Fig. 17. Fort Robert, 1950, the dugout remains of semi-subterranean soldiers' huts can be seen on the steep slope to the south. (New Zealand Aerial Mapping 1787/5).

TO SENTRY HILL

MAHOETAHI STOCKADE

In the First Taranaki War a stockade was put up on a knoll – and old pa, Ngapuketurua – on the left bank of the Waiongana River, to help secure the Devon Road to Waitara (Prickett 1994a:54–57). The post was held by Pakeha forces until Waitara was abandoned on 13 May 1863 at the outset of the second war, when it was given over to Mahau, a ‘friendly’ Te Atiawa chief. On 15 February 1864 Mahoetahi was re-occupied by troops and local forces following instructions to Colonel Warre earlier in the month (AD1, 64/363) to build a redoubt at nearby Sentry Hill. A signal station was established at the post the day the troops arrived (NP Garrison Quarter Master Letter Book, 16 Feb 1864).

When the defences at Sentry Hill were completed the Mahoetahi garrison was reduced to 20 men under Lieutenant Mills, 57th. By October the post was occupied by 26 Military Settlers and 27 of the 70th Regiment. The regulars withdrew in November and were sent forward to Te Arei Redoubt, but were apparently back at Mahoetahi in May 1865. On 1 July 1865 Mahoetahi Stockade was held by 34 regular troops, including five Royal Artillery, plus 16 local men. It is likely the post was abandoned shortly after.

Following re-occupation of the stockade in 1864 the post was enlarged by an earth breastwork thrown around a second knoll. The twin fortification with an encampment on lower ground, is shown in Colonel Warre's sketch (Fig. 18), which dates from the move to Mataitawa in October 1864. An outline plan is given by the surveyor S. Percy Smith on page 10, Fieldbook W.1 (DOSLI, New Plymouth).



Fig. 18. "Mahohitahi Oct 10th 1864". (H.J. Warre Sketchbook, Alexander Turnbull Library). A redoubt and stockade occupy adjacent lahar mounds; activity relates to the spring 1864 advance on Mataitawa.

Mahoetahi Stockade was situated just south of Devon Road, between State Highway 3A and the Waiongana River. The stockaded, southerly, hill is topped by a platform *ca* 12 m in diameter, below which, on the north slopes are some terraces. On the lower hill the irregular platform for earthwork defences is *ca* 24 x 17 m. There has been some damage by quarrying, but no cultivation so that the site may be largely intact.

SENTRY HILL REDOUBT

Sentry Hill was named for the Maori lookouts who maintained a watch from the commanding position during the First Taranaki War. Maori themselves called the hill 'Te Morere'. A plan to establish a military outpost on the hill early in 1860 was not put into effect (*Taranaki Herald* 11 Jan 1860).

In January 1864 Colonel Warre decided to establish a redoubt on Sentry Hill, in order to push forward the exclusion zone for enemy forces, halt communication between Maori living in areas under European control and those still fighting, and prepare for an advance on Manutahi and Mataitawa at the end of the inland track from the south (NP Garrison Quarter Master Letter Book 23 Jan 1864). This was the first European fortification thrown up north of New Plymouth in the Second Taranaki War and foreshadowed considerable military activity in the area over the next spring and summer.

"On Monday last [15 Feb 1864], at 5 a.m., a force of 250 men – 100 of the 57th under Capt. Shortt, a few of the Royal Artillery under Lieut. Larcom, the two companies of Bushrangers and some of No. 1 Militia, under Captains Atkinson and Webster, the whole commanded by

Major Butler, 57th Regt. – left town to take possession of Sentry Hill. Col. Warre, C.B., accompanied the force to direct the first day's operations.”

(Taranaki Herald 20 Feb 1864)

A halt was made at Mahoetahi where a camp was pitched and the post which had been abandoned in 1863, re-occupied. The greater part of the force then went on to Sentry Hill where the Royal Engineer Lieutenant Ferguson laid out the redoubt and superintended construction (*Taranaki Herald* 20 Feb 1864). The Sentry Hill force was joined on 16 February by 150 Military Settlers from Melbourne, who had arrived in New Plymouth on the *Gresham* two days previously (NP Garrison Quarter Master Letter Book 16 Feb 1864).

“The work was found to be much more tedious than was expected, from the fact of there being a great deal of stone just under the surface; the soil was also so light that it was feared the embankment would not stand...but the plentiful use of fern was found to overcome the difficulty, and the banks seem likely to stand well. When finished they will be 14 or 15 feet high from the bottom of the ditch and nearly perpendicular. The redoubt itself is a simple square – flanking corners being unnecessary from the height of its sides and its commanding position, and it is meant to hold 75 men.”

(Taranaki Herald 20 Feb 1864)

Colonel Warre visited the new position on 19 February and wrote in his journal, now held in the Alexander Turnbull Library,

“The Redoubt is built much too hastily the parapets too [steep?] and too much fern has been used so that in a few weeks it will subside & very likely slip altogether the earth is not good for building parapets but I told Mr Ferguson what to expect before hand...”

Warre reported on 22 February that the redoubt was complete, and occupied on the 20th by a company of the 57th under Captain Shortt (NP Garrison Quarter Master Letter Book 22 Feb 1864). He goes on to say that, “owing to the Rocky and loose nature of the soil and confined space on Sentry Hill, I was obliged to direct a small Stockade to be placed, as a flank defence on an adjoining knoll.” The stockade was 200 m north east of the redoubt, 22 of the Melbourne men remaining for a time with Captain Shortt's company to help in its construction (*Taranaki Herald* 27 Feb 1864). A blockhouse was built within the redoubt in March (NP Garrison Quarter Master Letter Book 2 Mar 1864).

Lieutenant Ferguson was soon to receive another blast, this time over construction of the nearby stockade. This reveals something of the principles and practical requirements of outpost defence and is worth quoting in full. In a letter dated 6 March 1864 the Garrison Adjutant, Lieutenant Brutton, writes,

“Sir

I am directed to inform you that on visiting Sentry Hill yesterday Col Warre was much disappointed to find the flank defence so very incomplete, and also, that you have apparently, misunderstood the Colonels object, and have expended much unnecessary time and labor in the construction of a work there are not men enough properly to defend.

I am to observe that by placing the flank Bastion on the wrong angle of the Stockade, one face has been left entirely undefended, and the door being placed on the front face, there is no possibility of reinforcing the men within, should an attack be made suddenly, and the enemy obtain possession of the Gully the stockade is intended to Command.

Col Warre desires me to add that he considers this work should not have been left to a sapper,

but that a N.C. Officer should have been sent from Town to have superintended, when you were precluded doing so yourself.

I am further to remark that Col Warre considers a great want of Judgement has been shewn in commencing a building, which is liable to be attacked, at any moment, on the rear insted [sic] of the Front face, and to request that the door may be placed on the West face of the stockade, and by erecting a light palisading, enable men to go in and out without being seen."

(NP Garrison Office Letter Book 6 Mar 1864)

An attack on Sentry Hill Redoubt on the morning of 30 April 1864 was beaten off with heavy casualties among the attackers. Cowan (1922–23 II:22–26) has a remarkable account of the one–sided fight by one of the attacking party. Colonel Warre's report is in the British Parliamentary Papers (1864 [3386]:31–32). At this time Captain Shortt was in command of 75 men (*Taranaki Herald* 7 May 1864). The attack was one of only two assaults on European military works in all the campaigning in north Taranaki. The January 1861 attack on No 3 Redoubt was equally unsuccessful.

In May troops north of New Plymouth were reorganised for the winter. The 57th at Sentry Hill returned to New Plymouth, their place being taken by militia from Mahoetahi who were in turn replaced by "friendly natives" at that post (NP Garrison Order Book 24 May 1864).

The establishment of redoubts inland in spring 1864 led to reductions in the Sentry Hill garrison. On 20 October Military Settlers at the post included two officers, three sergeants and 57 rank and file (NP Garrison Quarter Master Letter Book 20 Oct 1864). Early in 1865 the garrison was reduced to 30 rank and file (NP Garrison Quarter Master Letter Book 11 Jan 1865).

Nonetheless, Sentry Hill remained important to the end of the decade because of its commanding central position at the corner of the Waitara and inland roads. In 1868 it was for a time the base for the newly formed Armed Constabulary before they moved into permanent quarters in New Plymouth (*Taranaki Herald* 7 May 1868). After the Maori attack on Pukearuhe in February 1869 it was occupied by Bushrangers under Captain Kelly (Taranaki Military Settlers Memo Book 19 Mar 1869). The last garrison at Sentry Hill was struck off pay on 24 November that year (Taranaki Militia and Volunteers Order Book 23 Nov 1869). An 1869 Defence Office Report states that the three room blockhouse was in good repair, but that the redoubt was in bad order (AD35/12).

Sentry Hill Redoubt is pictured in a surveyor's fieldbook pencil sketch (Fig. 19). The high walled redoubt has a bridge over the ditch to a gate on the north side. Two barrack buildings of the usual form stand inside and there is a hut outside. A watercolour by Colonel Warre shows the redoubt and stockade from Mahoetahi (Fig. 20). There is also a pencil sketch on p. 35 in the Warre Sketchbook, Alexander Turnbull Library.

A fieldbook issued to the surveyor Frederick Carrington has a rough ground plan of the redoubt and stockade, dated 15 March 1867 (Fieldbook I.20, p. 22, DOSLI, New Plymouth). The barrack buildings are on the west side of the redoubt interior, with an open area within the gateway. The stockade is marked "33 links square" – at 190 mm per link, this makes it ca 6.3 x 6.3 m.

Sentry Hill is just off the Waitara–Inglewood road (Highway 3A), 2 km from the junction with Devon Road. The hill has been destroyed by quarrying and nothing remains of the redoubt. I have not found any surface evidence at the stockade site on the knoll north of the road.

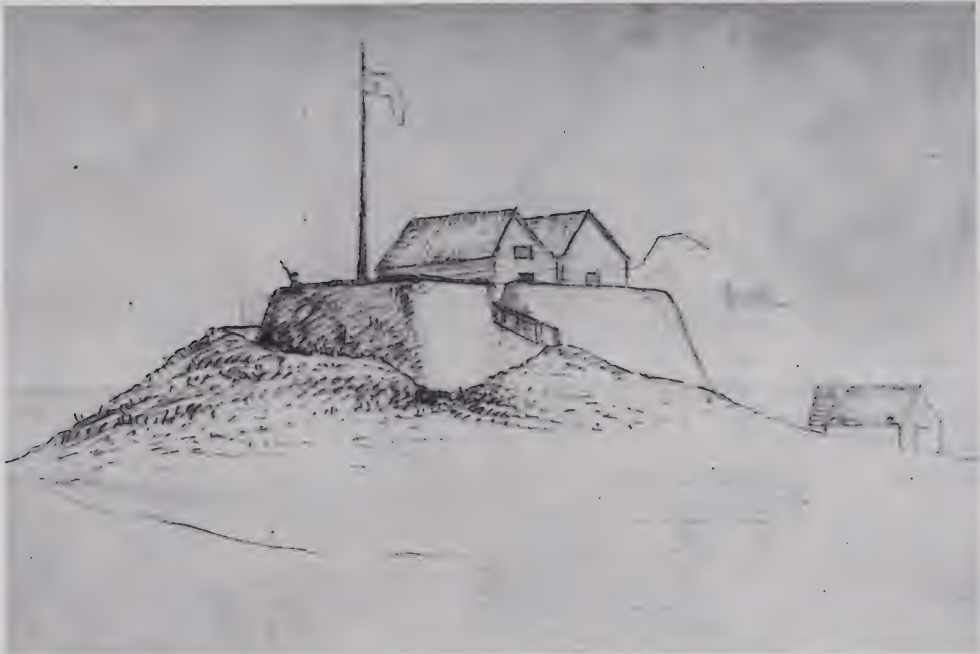


Fig. 19. Sentry Hill Redoubt. (S. Percy Smith, Fieldbook W.I. DOSLI, New Plymouth).



Fig. 20. "Morere or Sentry Hill Redoubt 1865". (H.J. Warre, Nan Kivell Collection, National Library of Australia). At left is the stockade added as flank defence; beyond is the redoubt.

CLOSING OFF THE KAITAKE RANGES

PAHITERE REDOUBT

Pahitere Redoubt was established on 1 March 1864 by part of Captain Corbett's company of Military Settlers at the same time as nearby St Andrew's Redoubt was re-occupied by troops. Both moves were to prepare for driving Maori forces from their strongholds in the Kaitake Ranges. The disposition of troops and militia in Taranaki at this time is given in the section on St Andrew's Redoubt.

Pahitere was always held by local forces, in conjunction with the regular troops at St Andrew's a kilometre away. A blockhouse was built within the redoubt in June and July 1864 (*Taranaki Herald* 25 Jun 1864), with accommodation for 40 men in addition to a store room and officers' quarters (AD35/12). On 31 May 1865 there were two subalterns, three sergeants, one drummer and 39 men, T.M.S., along with a 43rd Regiment drummer (AJHR 1865 A-5:63-64). The position declined in importance in late in 1865 and 1866 as the frontier was pushed south. In July 1866 there was just one man in residence, from No 2 Company, T.M.S. (Taranaki Military Settlers Memo Book 6 Jul 1866). The post was given over to Ropata Ngarongomate in November that year (Taranaki Military Settlers Memo Book 6 Nov 1866).

Pahitere Redoubt is situated near the corner of South and Koru Roads, near Oakura, 200 m inland of the main road (Fig. 21). An old pa (Pahitere) on a prominent knoll has been reshaped, the redoubt retaining the double ditch and bank which almost entirely encircles the central platform. Remains of the pa are described in my account of Maori fortifications of the Omata and Oakura districts (Prickett 1980:30-31).



Fig. 21. Pahitere Redoubt, 1975. An aerial view shows how an older pa was modified for the European fortification. Below the redoubt depressions mark the sites of dug-in soldiers' huts. The blockhouse building from the redoubt can be seen bottom right.

The 25 x 11 m rectangular platform without flanking defence was largely reworked by the Military Settlers, and had an earth breastwork still about “3 ft. high in some parts” when seen by Elsdon Best (1975:222) early this century. This is no more than 150–200 mm high today.

Figure 22 is a photograph by Lieutenant Nicholl of the post in summer 1864–65. The blockhouse has survived, shifted out of the redoubt and over a gully to serve for many years as a farm cottage (Fig. 21). A verandah has been added and an addition at the back has led to an alteration to the roof line. Blockhouses like this were prefabricated in kauri in Auckland and were shipped to various campaign theatres in New Zealand.

The redoubt earthworks are in excellent order. On the eastern slope of the hill a number of depressions marking hut sites can still be seen. Gorse and blackberry on the steep scarps protect the earthworks from stock damage and erosion.

KAITAKE REDOUBT

When St Andrew’s Redoubt was re-occupied in March 1864 the British command was able to turn its attention to enemy strongholds on the northern flanks of the Kaitake Ranges. These controlled the first of three Maori routes into north Taranaki which were soon to be closed off by European forces. The others were the inland Whakaahurangi track from the south and the coastal route from the north, which were blocked the following spring and autumn. Deputy Quartermaster General Colonel Gamble reported,



Fig. 22. Pahitere Redoubt from the east, showing dug-in soldiers’ huts, two with barrel chimneys, also a dovescote and well. A causeway over the outer ditch leads to the main entrance by way of a bridge across the inner ditch. Access to the ditch 5 m from the south-east corner gave a protected route into the redoubt from outside huts should the post come under attack, the main gate being very exposed. (Volume 2, Nicholl Album, Alexander Turnbull Library, Wellington).

“The possession of Kaitake is of the greatest importance in every respect. It practically clears out the enemy from the south of the town of New Plymouth, intercepts his easy communication with Mataitawa on the north, facilitates the re-occupation of and communication with Tataraimaka, and will insure the cultivation of the valuable Oakura block of land without danger.”

(War Office 0270.I:103)

The Kaitake pa had already been reconnoitred and shelled on 23 December 1863 (War Office 0270.I:81). On 11 March 1864, after the re-occupation of St Andrew’s Redoubt, Major Butler led a small force to the Maori strongholds but withdrew under fire (GBPP 1864 [3386]:10–12). On 25 March, at the end of a four day operation aimed at turning the enemy out of all their strongholds in the ranges, the two main pa, upper and lower Kaitake, were taken. Colonel Warre was in command of Volunteers, Military Settlers and 57th Regiment totalling 700 men (GBPP 1864 [3380]:3–7). Colonel Gamble gives an excellent map showing Maori positions and disposition of attacking European forces (War Office 0270.I:opp. 101).

The first pa taken, on 22 March, was Te Tutu, “...situated on the Katikara River, four miles above the rebel position, so successfully attacked by the Lieut.-General on the 4th June 1863” (GBPP 1864 [3380]:3). In May 1863 Te Tutu was reported held by Hori Patene of Wanganui, and at the time there was a pa seaward of Te Tutu named ‘Okaroa’ (*Taranaki Herald* 16 May 1863). The trig ‘Tutu A’ (152 m above sea level; P19 887245) fits the location, although searching has not revealed archaeological remains. Ahu Ahu was taken on 24 March. This position was situated on a steep spur of the Kaitake Ranges rising from the present main road close to the Ahu Ahu Road corner (see Cape III (14/5) blocksheet, DOSLI, New Plymouth). Ahu Ahu was occupied in May 1863 by people from Warea under Aperahama (*Taranaki Herald* 16 May 1863).

The upper and lower Kaitake pa were close together on the ridge east of the upper end of Wairau Road (and are marked on a map by Colonel Warre – War Office 0270.I:opp. 101). In 1863 they were held by Parenga Kingi and Tamati Oraukawa (*Taranaki Herald* 16 May 1863). Rifle pits were located below them on the spur; a stockade extended across the valley of the Wairau Stream. A drawing in the Warre Sketchbook, Hocken Library (p. 83), and watercolour in the Nan Kivell Collection, Australian National Library, give a distant view of Maori defences. Kaitake Redoubt was placed on the upper pa. Nothing remains of the lower Maori position.

“The three days following the capture of Kaitake the troops were busily employed in turning the upper pa into a first-rate redoubt, and great credit is due to the regulars and militia for the energetic way they worked, but under the superintendence of such an indefatigable officer as Lieut. Ferguson R.E., this perhaps is only what might have been expected.”

(*Taranaki Herald* 9 Apr 1864)

But Colonel Warre was displeased with work on the new redoubt, Lieutenant Ferguson receiving a letter from the Garrison Office as follows:

“Sir

I am directed to inform you that the Col Comm’g considers the Redoubt at Kaitake requires your immediate attention, and he requests you will proceed tomorrow morning and remain at Oakura or Kaitake, as may be most convenient until the Redoubt is placed in a perfectly defensible state, which the Colonel cannot consider it at present.

If wet weather, owing to the banquette being constructed on a slope, in some places, it is

impossible to walk upon it – the parapets in places, and particularly on the S.W. side near the upper angle – have sunk so much as to afford no cover to the defenders, and owing to the parapet on that side having been constructed on the inside instead of the outside of the old Stockade – the stockade obstructs the fire of the defenders, and must be removed.

It will also be necessary to clear off the whole of the Palisading in front, Viz: the old Pa & wharres [sic], – leaving nothing to interrupt the fire from the Redoubt, the garrison of which, as soon as you report these arrangements complete, will be reduced, so as to allow every tent, and every man at night – to remain within the parapets.”

(NP Garrison Office Letter Book 11 Apr 1864)

At the beginning of April Colonel Warre reported to the Deputy Quarter Master General, Auckland, on the construction of the redoubt, “... which the Troops have done me the honour, with the sanction of the Lieut General Commanding to Christen ‘Fort Warre’” (NP Garrison Quarter Master Letter Book 1/2 Apr 1864). Sanction was presumably forthcoming for the post is occasionally called ‘Fort Warre’ in the months following (for example, a letter addressed to the “Officer Commanding Fort Warre”, NP Garrison Office Letter Book, 16 Oct 1864), although it is usually ‘Kaitake Redoubt’.

On 6 April Captain Thomas Lloyd led a patrol of 57th Regiment and Military Settlers from the redoubt along the flanks of the ranges to destroy enemy crops. The party was ambushed at Ahu Ahu, with Lloyd, two of the 57th and four Military Settlers killed (Cowan 1922–23 II:15–17). The episode led to Lloyd’s head being shown about the North Island as proof of the efficacy of the new ‘Hau Hau’ faith. The Maori trenches at Ahu Ahu were still clearly to be seen in the 1980s.

The garrison at Kaitake Redoubt was first made up of a company of the 57th under Captain Russell, plus Captain Carthew’s company of Military Settlers (*Taranaki Herald* 26 Mar 1864). It was held by men of the 57th and 70th Regiments and local forces through the winter of 1864. Duty at the post was considered “irksome” and the garrison was for some time changed every month (NP Garrison Office Letter Book 25 Apr 1864). A blockhouse was completed in the redoubt at the end of August 1864 and was initially occupied by Captain Stewart of the 57th (Warre Journal 27 Aug 1864). Early in September it was taken over by Military Settlers, this probably marking the withdrawal of regular troops from the post (NP Garrison Quarter Master Letter Book 5 Sep 1864).

In October Warre gave orders that Military Settlers at the post were not to be reduced below 60 men (NP Garrison Office Letter Book 18 Oct 1864). Soon, however, the garrison was subject to the same reduction as other positions left in the rear of the advancing European frontier. On 31 May 1865 numbers were down to 29 T.M.S. (AJHR 1865 A–5:63–64). The post was locked up for a time following the transfer of local forces to the Patea district in September 1866 (Taranaki Military Settlers Memo Book 26 Sep 1866). Kaitake Redoubt was then maintained only for emergencies, to be occupied for the last time during the White Cliffs scare of 1869 (Taranaki Military Settlers Memo Book 26 Mar 1869).

There are two photographs of Kaitake Redoubt in the Nicholl Album, Alexander Turnbull Library. The one reproduced here shows the redoubt with tents, huts and signal mast outside, and blockhouse within (Fig. 23). Layers of fern bind the light soil earthworks. Information on a Taranaki Museum print of the photograph states that the men belong to Captain Hussey’s company of Military Settlers – at the post in late 1864 and early 1865 – and that Captain Messenger is present. Messenger visited the post over Christmas 1864 (*Taranaki Herald* 7 Jan 1865), and it is likely the picture dates from this time. The date is consistent with the photographs of St Andrew’s and Pahitere Redoubts and almost certainly dates the entire series.



Fig. 23. Kaitake Redoubt. (Volume 2, Nicholl Album, Alexander Turnbull Library).

Kaitake Redoubt is located on a high point of the major spur of the Kaitake Ranges which falls to the north between today's Wairau and Surrey Hill Roads, at the edge of a steep drop to the Wairau Stream (Fig. 24). The trig '10863' (211 m above sea level) is situated at the northern angle of the work. On the near slope tell-tale depressions mark soldier's huts and other buildings.

The work was *ca* 40 x 17–13 m (Fig. 25). The plan is confirmed by aerial photograph 1789/9 taken in 1950. Flanking defence appears to have been directed solely at the southern (forward) part of the two long sides. The south and west ditches are still distinct, and the entrance over the northern ditch remains visible. The eastern side has been damaged by a bulldozed farm road.

LOWER KAITAKE BLOCKHOUSE

At the end of winter 1864 work was begun on a blockhouse in the Wairau Stream valley below Kaitake Redoubt. The new post was intended to complement the key position on the hill above.

The new post was first occupied by one lieutenant, a sergeant and 20 rank and file, probably of the 57th Regiment from Kaitake Redoubt, on 16 October (NP Garrison Office Letter Book 16 Oct 1864). Two days later the troops were replaced by an officer and 25 men from the Military Settlers at Oakura (NP Garrison Office Letter Book 18 Oct 1864). In November this garrison was ordered to rejoin Captain McKellar's company which moved forward to establish Timaru Redoubt (NP Garrison Office Letter Book 25 Nov 1864). Lower



Fig. 24. Kaitake Redoubt, 1975, from the north-east. Beyond is the valley of Wairau Stream.

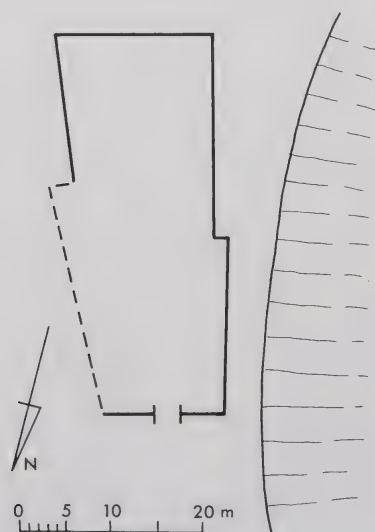


Fig. 25. Plan of Kaitake Redoubt.

Kaitake Blockhouse was then occupied by one officer and “not less than” 15 rank and file from Captain Mace’s company, T.M.S., from Kaitake Redoubt.

On 20 December 1864 Colonel Warre gave permission to shut up the blockhouse during the day (NP Garrison Office Letter Book 20 Dec 1864). In February 1865 the night guard too was withdrawn (NP Garrison Office Letter Book 3 Feb 1865), and in August that year the building was removed and re-erected at the nearby Ahu Ahu town site (AD1, 65/2452).

The Lower Kaitake Blockhouse is located on the Wairau II block sheet. The original record can be found in the relevant fieldbook (Blocksheet 45/4; Fieldbook O.7, p. 58, DOSLI, New Plymouth). Interestingly the surveyor indicates partial redoubt or stockade defence. The reference to the removal of the blockhouse mentions “palisading” and it is likely therefore, as was commonly the case, that the blockhouse was enclosed by a stockade, like the Mataitawa Blockhouse pictured in Figure 40. The site is just off the original line of Wairau Road on the rise about 200 m beyond the present road end. No surface evidence remains.

SECURING THE HINTERLAND

After the killing of a farmer named Pattison on Frankley Road on 28 February 1864 moves were made to secure the farming districts behind New Plymouth. In response to a settlers’ petition Colonel Warre decided to build three blockhouses in the area (AD1, 64/1225). Interestingly, Warre refers to a 23 April 1861 report by Royal Engineer Colonel Thomas Mould who urged a ring of six blockhouses from the Waiwakaiho River to Omata at the close of the first war in Taranaki. The new blockhouses relate to reoccupation of St Andrew’s Redoubt and the expulsion of Maori forces from the Kaitake Ranges which occurred at the same time.

The new positions overlooked the Waiwakaiho, Henui and Huatoki stream valleys respectively, at the same time commanding the Mangorei, Carrington and Frankley Roads to inland farms. Later a decision was made to erect a fourth blockhouse at Allen’s Hill on Hurford Road.

DINGLE’S BLOCKHOUSE

Colonel Warre initially made the proposal to build, “2 or 3 Blockhouses behind the town – one where Mr Pattison was shot”, on 15 March 1864 (NP Garrison Quarter Master Letter Book). At the end of March an offer was made by Mr Burton and other settlers to build the first of these at Dingle’s farm (NP Garrison Quarter Master Letter Book, 29 Mar 1864). On 13 May it was reported that the tender of Messrs Burton and Kelly for the erection of three blockhouses was successful and that Dingle’s is in the course of construction, to be completed about 20 May (NP Garrison Quarter Master Letter Book).

A ditch was dug around the blockhouse, “in the same manner as that at the Omata Stockade” (NP Garrison Quarter Master Letter Book, 4 Apr 1864). The building itself appears not to have been entirely satisfactory, however, and on 2 June Warre wrote in his diary,

“After disposing of the office business I rode out with Capt Mace to Dingles to see the new Blockhouse which is nearly completed & looks well altho it is not bullet proof & it is very difficult to make it so.—being already overweighted with 4 inch lining through which the ball penetrates with difficulty.”

Dingle’s Blockhouse was held for about 18 months. On 31 May 1865 these comprised



Fig. 26. "Dingles Blockhouse Taranaki". (H.J. Warre, Nan Kivell Collection, National Library of Australia).

eight men of the old Taranaki Militia (AJHR 1865 A-5:63-64), who were struck off pay on 30 June and replaced by three Military Settlers (AD6/4, 65/4120). The post was abandoned early in January 1866 and handed over to Mr Dingle, the land-owner (Taranaki Military Settlers Memo Book, 6 Jan 1866). Three years later the building was in disrepair (AD35/12).

The sketch by Colonel Warre (Fig. 26) shows a two-storeyed building with upper floors overhanging the lower. This picture is unclear on loopholing except on one side, but the post was probably loopholed all around on both floors like Puketotara and Ratanui. A bridge crosses the ditch to a door. With the Warre sketch is a brief description including the remark that the, "...upper story projects over the lower to enable the defenders by opening small trap doors to fire into the ditch."

Dingle's Blockhouse was on a knoll now cut by Frankley Road 100 m south of the corner with Patterson Road (where a cairn marks the place Pattison/ Patterson was killed). The site is in good condition except for the west side which has been shaved off by road works (Fig. 27). A now shallow ditch surrounds a platform *ca* 14 x 10 m (Fig. 28). There is a discrepancy between the building pictured by Warre and the larger structure suggested by the field evidence.

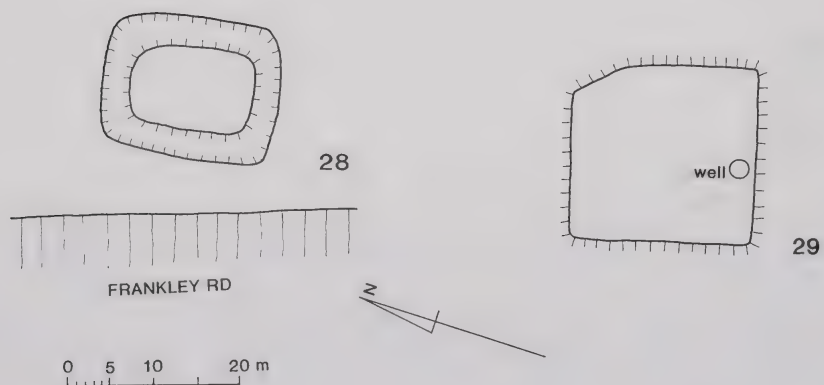
RATANUI BLOCKHOUSE

On 18 July 1864 Lieutenant Clarke, Deputy Assistant Quarter Master General at New Plymouth, wrote to Messrs Burton and Kelly on behalf of Colonel Warre urging them to hurry and complete work on the Ratanui Blockhouse (NP Garrison Quarter Master Letter Book). Approval for payment of the contractors' account was given on 12 September (NP Garrison Quarter Master Letter Book). Ratanui Blockhouse is sometimes called 'French's Redoubt' after the owner of the land at the time (as in Taranaki Military Settlers Defaulters Book, 10 Dec 1864).

Like the other blockhouses Ratanui was occupied only by local forces, in April 1865 men of Captain Messenger's Number 6 Company, T.M.S. (*Taranaki Herald* 8 Apr 1865). By 31



Fig. 27. Aerial view of the Dingle's Blockhouse site, 1975, now cut by Frankley Road.



Figs 28–29. Archaeological field evidence. 28. Dingle's Blockhouse. 29. Ratanui Blockhouse.



Fig. 30. "Ratanui Blockhouse Nov 9 [1864]". (H.J. Warre Sketchbook, p. 33, Alexander Turnbull Library).

May it was held by five men of the old Taranaki Militia (AJHR 1865 A-5:63–64), in turn struck off pay and relieved by three Military Settlers on 30 June (AD 6/4, 65/4120). The post was probably given up with the increased security of the district about the time Dingle's Blockhouse was abandoned. In 1869 the blockhouse was reported "out of order" (AD35/12).

A pencil sketch by Colonel Warre shows a two-storey loop-holed blockhouse, like Dingle's except that it is enclosed by an earth breastwork (Fig. 30). A shed can be seen outside the fortification. The Warre sketch enables us to locate the site. The view is from the rise on which the present Ratanui homestead stands off Carrington Road. The road can be seen running across the picture.

The site is behind a farmhouse, 50 m east of Carrington Road and 200 m on the town side of the Atkinson Road corner. Surface evidence may have been damaged by later buildings on the site. A ca 20 x 20 m platform sits slightly above the gentle natural slope (Fig. 29). A well, said to be 120 feet deep, is covered by the concrete base of a water trough just inside the northern edge of the platform. The site is well situated to command a wide view of the Henui River valley.

PUKETOTARA BLOCKHOUSE

Puketotara was the third blockhouse built in 1864 to secure rural districts inland of New Plymouth. Like the others it was garrisoned by local forces; if indeed it was occupied by European forces at all, in December 1864 it was held by "friendly natives" (NP Garrison Office Letter Book, 2 Dec 1864). There was no garrison in May 1865 (AJHR 1865 A-5:63–64). In 1869 the building was reported in "very bad order" (AD35/12). A drawing by Colonel Warre shows Puketotara to be the same design as Dingle's and Ratanui but without earthwork defence (Fig. 31). The Rex Nan Kivell Collection, National Library of Australia, holds watercolours by Warre of Ratanui and Puketotara, worked up from his pencil sketches.



Fig. 31. "Puketotara Nov 18th [1864]". (H.J. Warre Sketchbook, p. 51, Alexander Turnbull Library).

The blockhouse was built near or on the site of Puketotara pa, destroyed by troops in September 1860 (see Prickett 1994a:44–45). This was on a terrace edge overlooking the Waiwakaiho River, across Mangorei Road from the junction with Karina Road. A house has been built on the site in recent years and no surface evidence remains. Earthworks which may relate to the blockhouse, or even the earlier pa, can be made out on aerial photograph 1786/10, taken in August 1950.

ALLEN'S HILL BLOCKHOUSE

Allen's Hill Blockhouse also relates to the autumn 1864 decision to secure the old farming districts behind New Plymouth. At first only three blockhouses were planned, but a fourth was soon after placed on Allen's Hill at the corner of Hurford Road and the new main road south which took the high ground around the head of Waireka Stream.

In July 1864 one officer and 25 men of the Military Settlers were posted to the new blockhouse from Fort Robert (NP Garrison Quarter Master Letter Book, 18 Jul 1864). Allen's Hill was occupied on 31 May 1865 by ten T.M.S. (AJHR 1865 A–5:63–64). It is not known when it was abandoned. The building, with accommodation for 25 men, was still standing in 1869 (AD35/12).

Allen's Hill is at the junction of Hurford and South Roads. The blockhouse was on top of the hill now deeply cut by the main road. In the 1869 Colonial Defence Office report (AD35/12) Allen's Hill Blockhouse is described in the same terms as Ratanui and Puketotara, and thus is likely to have been a two-storey building, with rifle slits all round, the upper level overhanging the lower. A watercolour by Colonel Warre in the Rex Nan Kivell Collection, National Library of Australia, gives a distant view of the Allen's Hill post beyond the Omata Stockade. No surface evidence remains.

POUTOKO BLOCKHOUSE

Poutoko Blockhouse was put up some time between July and October 1864, replacing St Patrick's Redoubt as the fortified post in the locality. It dates from after the four posts introduced above, but like them secured the old New Plymouth farming districts at a time when active campaigning moved away to the north and south. On 16 October the officer commanding at Poutoko was ordered to pull down the right front face (nearest the road) of St Patrick's Redoubt which was recently vacated by military settlers (NP Garrison Office Letter Book).

In April 1865 Poutoko was held by men of Captain Percival's No. 7 Company, T.M.S. (*Taranaki Herald* 8 Apr 1865), on May 31 numbering one sergeant and 19 rank and file (AJHR 1865 A-5:63-64). Except for one corporal and four privates these men were struck off pay on 17 June to take up confiscated land in the vicinity, parading monthly at the blockhouse for an inspection of arms (AD6/4, 65/4118). Poutoko was still occupied as late as March 1866 (*Taranaki Military Settlers Memo Book*, 3 Mar 1866). It is unclear when it was finally abandoned.

The 1869 the Colonial Defence Office reported a "...large hole burnt in floor, stockade out of repair, 13 panes of glass broken" (AD35/12). The report describes a "Blockhouse and Redoubt", with accommodation for 35 men, plus an officer's and store room. Nonetheless, it is unlikely the post had any earthwork defence; it was probably a single-storey building within a stockade, like Mataitawa Blockhouse (Fig. 40).

Evidence of the location of Poutoko Blockhouse is to be found on a "Plan shewing the surveyed lands within the Province of Taranaki", signed by Octavious Carrington and dated 9 December 1865, held in the Department of Survey and Land Information head office, Wellington. The post is shown just west of the main South Road, 250 m south of the present Waireka Road corner, presumably on the commanding rise here. The map reference is *ca* 584867. I have not found any archaeological evidence.

TO TE AREI AND MATAITAWA

In spring 1864 European military authorities moved to expel Maori from the forest edge inland of Mahoetahi and Sentry Hill. The area was a refuge for people who had fled Waitara at the start of the First Taranaki War, and it was at the northern end of the Whakaahurangi track by which Te Atiawa and other tribes fighting in the districts about New Plymouth received assistance from south Taranaki. Te Arei, which was attacked in 1861, had been reoccupied and strengthened, and a fortified pa by the name of Manutahi was at the south end of today's township of Lepperton. Undefended settlements and gardens of maize, potatoes and kumara were scattered among forest clearings.

Early in October Colonel Warre led British troops and local forces into the area. Positions were established at Te Arei, Mataitawa, Manutahi and Matakara (Fig. 32), and also at the old No 6 Redoubt at Huirangi (see Prickett 1994a:72-73). A key post was at Mataitawa where Whakaahurangi track came out of the bush, and where there had been a lightly defended Maori settlement at the edge of high ground overlooking a wide area to the north. Following the military advance the European farming frontier was pushed on to the Waitara River as soldier settlers took up land and townships were laid out at Mataitawa, Manutahi (Lepperton), Huirangi and Manganui.

European forces first advanced from Mahoetahi.

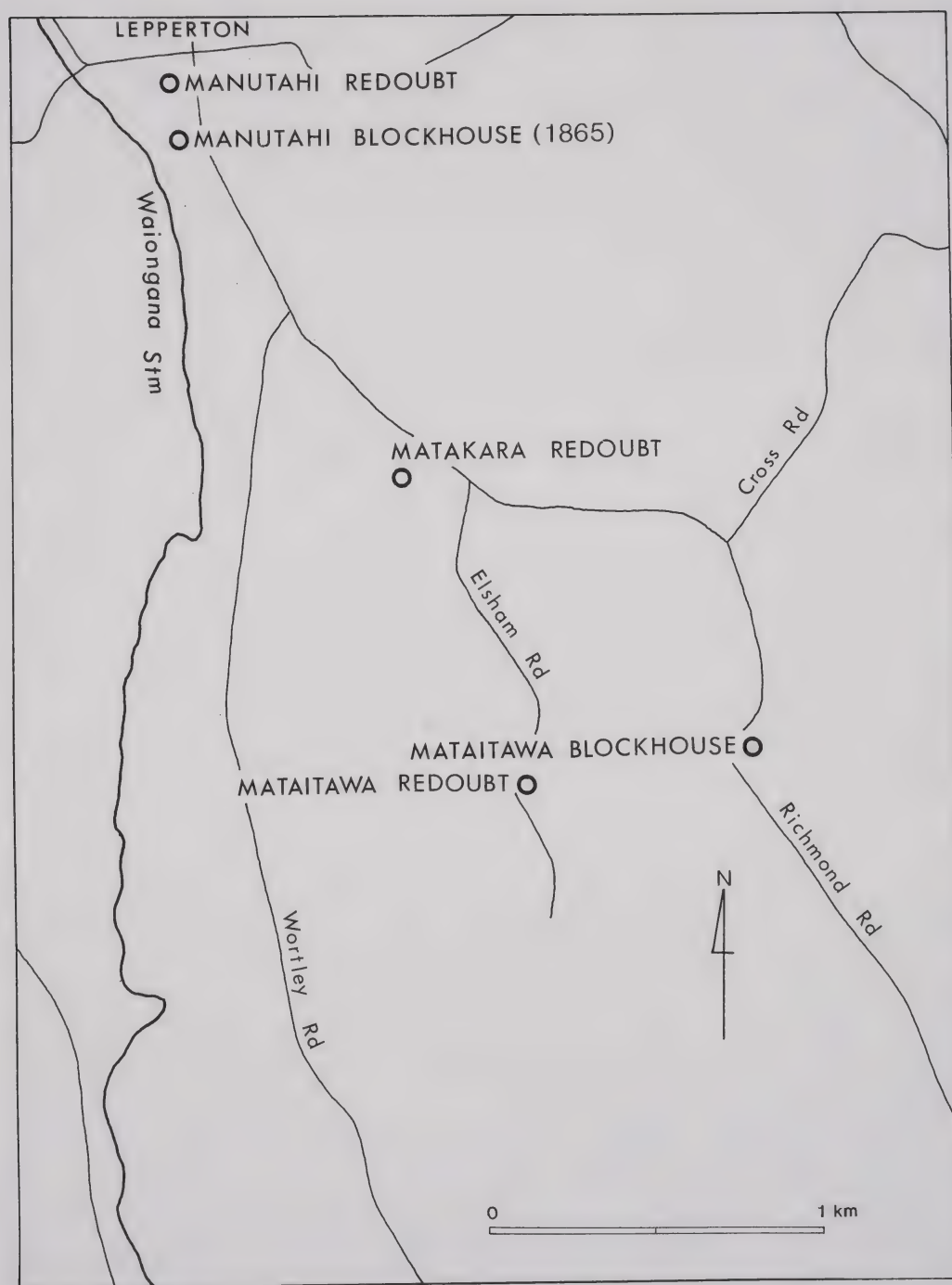


Fig. 32. The Lepperton district showing location of 1864–65 military posts in relation to modern roads.

“... early on Saturday morning, 8th inst., a force consisting of 200 of the 70th under Major Ryan, two field guns in charge of Capt. Martin, R.A., Capt. Good’s, and Capt. Jonas’ companies of Bushrangers 100 in all under Major Atkinson, and Captain Maces’ mounted men, started northward... at Mahoetahi they were joined by 150 more of the 70th under Major Saltmarsh – the whole under command of Col. Warre, C.B., who was attended by his staff and also by Col. Lepper and Mr. Parris.”

Taranaki Herald 15 Oct 1864

Except for a few shots fired from Mataitawa the Maori settlements were not defended and their inhabitants retired into the bush to the south (GBPP 1865 [3425]:168–171). Colonel Warre’s force then pulled back, but returned a few days later to effect a permanent occupation.

A letter from Colonel Warre to the Deputy Quarter Master General, Auckland, dated 20 October 1864, details the garrisons at all posts north of New Plymouth at this time.

		F.O.	Officers	Sergt	R & F
Te Arei	70th Regt		6	10	164
No 6 Redoubt	My Settlers		3	4	100
Mahoetahi	do		1	1	24
do	70th Regt		1	1	25
Sentry Hill	Mily Settlers		2	3	57
Manutahi	do		5	8	150
Mangakara	Bushrangers	1	6	8	105
Mataitawa	70th Regt	1	8	12	208
Total		2	32	47	833

(NP Garrison Quarter Master Letter Book)

TE AREI REDOUBT

Te Arei was taken on 11 October 1864, three days after the operation at Manutahi and Mataitawa, but the redoubt there was the first established in the area – to control enemy movement according to Colonel Warre (Journal, 10 Oct 1864). At the same No 6 Redoubt at Huirangi, dating originally from 1861, was reoccupied to maintain communication with Te Arei.

“On Tuesday morning, at daybreak, another expedition started from Mahoetahi, where it had camped the night before, to take Te Arei, Hapurona’s stronghold. It consisted of 350 men of the 70th, under Majors Rutherford and Saltmarshe and Captains Backhouse and Ralston, a detachment of Artillery under Captain Martin, Captain Mace’s mounted men, and about 100 friendly natives – the whole under the command of Colonel Warre.”

(Taranaki Herald 15 Oct 1864)

Te Arei was taken without a shot being fired, the occupants retiring into the bush to the south.

Some troops went on to destroy Te Peketu and Pukemahoe, two small villages in the bush beyond Te Arei.

“After burning the whares and picking up the few unconsidered trifles that were to be found the force returned to Te Arei where a large redoubt was already in course of construction. This is now occupied we believe by 150 of the 70th under Major Rutherford; and to keep open the

communication, No. 6 Redoubt has been occupied by Captain Page's company of Military Settlers."

(*Taranaki Herald* 15 Oct 1864)

In the Nan Kivell Collection, National Library of Australia, are two watercolours of Te Arei by Colonel Warre. One shows troops making use of General Pratt's 1861 sap and No. 8 Redoubt in their approach on the pa ("Rebel (Natives) pa, Te Arei", NK 4263/12). The other depicts the outworks of the pa ("Rebel Pah at Te Arei", NK 4263/13). In the Alexander Turnbull Library Warre sketchbook is another picture of the Maori works, and the inscription: "Unlike ordinary Pahs the Rebels had constructed a formidable parapet in front (about 40 yards) of the stockade – connecting the two works by covered ways about 3 feet deep..."

Construction of Te Arei Redoubt was overseen by Lieutenant Ferguson (NP Garrison Quarter Master Letter Book, 12 Oct 1864). On 20 October Colonel Warre reported to the Deputy Quarter Master General, Auckland, that, "the Redoubt at Te Arei is nearly completed, and I believe 100 men would hold it against any number of Natives" (NP Garrison Quarter Master Letter Book). In the same report the garrison is given as six officers, ten sergeants and 164 men, 70th Regiment.

At the end of November the redoubt was held by 150 men under Captain Ralston (NP Garrison Quarter Master Letter Book, 29 Oct 1864), and at the end of February 1865 it was still occupied by 170 men, now under the command of Major Saltmarshe (*Taranaki Herald* 4 Mar 1865). On 1 July that year the garrison was down to 113 (WO 0270.II:434). Following the departure of the 70th from Taranaki the 43rd Light Infantry occupied Te Arei, in their turn being relieved on 21 December 1865 by the 68th (NP Garrison Order Book, 19 Dec 1865).

On 13 February 1866 Military Settlers took over from the 68th (NP Garrison Order Book, 12 Feb 1866). Ten days later one corporal and four privates from No. 5 Company, T.M.S., took over from the initial detachment under Captain Jonas (Taranaki Military Settlers Memo Book, 23 Feb 1866). As late as February 1867 Military Settlers under Major Baddeley were stationed at Te Arei (Taranaki Military Settlers Memo Book, 13 Feb 1867), which was probably abandoned soon after. In 1869 a blockhouse was built on the edge of the escarpment a few metres to the west (Prickett 1981:221–223).

A pencil sketch of the redoubt shows the main gate on the northern (rear) face, close to the north–west angle (Fig. 33). Beyond is Tikorangi Redoubt which was thrown up in November 1865 north of Waitara River (see Prickett 1981:195–203). The sketch dates from late January 1866, like the sketch of Mataitawa (Fig. 35) by the same unknown artist.

Te Arei Redoubt is situated in Pukerangiora Historic Reserve on Te Arei Road. The surveyor's fieldbook sketch plan and blocksheet (Waitara IX (47/11) Blocksheets; Fieldbook W.1, p. 17, DOSLI, New Plymouth) show flanking defence covering the north and south sides only. Not shown is the bastion at the north–west angle which covers the west face, for which there is clear archaeological evidence.

The redoubt is ca 30–35 x 53–66 m in size (Fig. 34). The cliff to the Waitara River makes up the east side. Earthworks of the two long sides are in good condition, while the third side (closest to Te Arei Road) has suffered considerable damage. Probably the defences on this face were thrown down in 1869 to allow the nearby blockhouse garrison command of the otherwise dangerous defensive position close by. Flanking defence also survives 2 m lower than the main redoubt level at the north–west angle.



Fig. 33. "The Redoubt of Te Arei, Taranaki, Capt'n Jonas' Station beyond". (Alexander Turnbull Library, Wellington). Captain Jonas' post at top left was Tikorangi Redoubt, established June 1865 on high ground north of Waitara River (Prickett 1981:195–203).

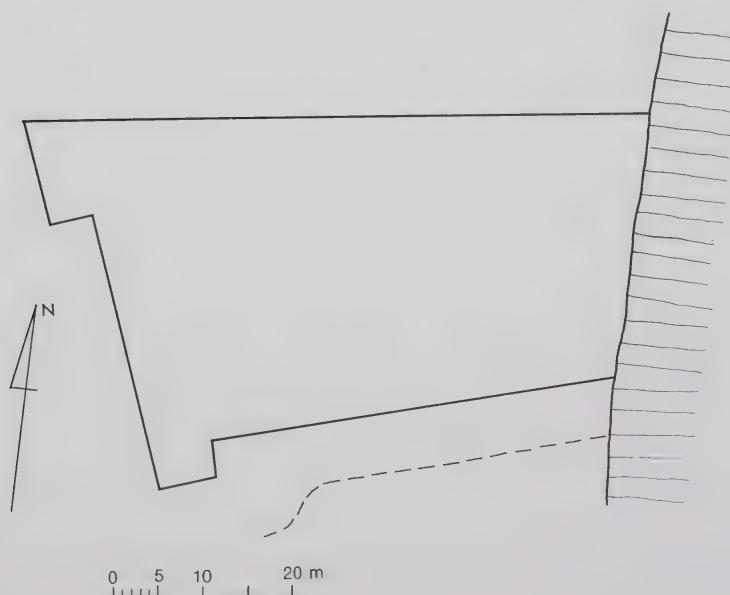


Fig. 34. Plan of Te Arei Redoubt.

NO 6 (HUIRANGI) REDOUBT

No 6 Redoubt at Huirangi, first thrown up during General Pratt's advance on Maori positions south of the Waitara River in early 1861, was reoccupied in 1864 when troops returned to Te Arei. At first Captain Page's company of Military Settlers took over the post (*Taranaki Herald* 15 Oct 1864), but they were soon replaced by regulars of the 70th Regiment. On 6 February 1865 30 men of the 70th were withdrawn from Huirangi, now held by a day piquet from Te Arei (*Taranaki Herald* 11 Feb 1865). At the end of the month Captain Corbett's company of Military Settlers was at the post (*Taranaki Herald* 25 Feb 1865), but only a month later Huirangi was again given up (*Taranaki Herald* 25 Mar 1865).

Later in 1865 a garrison returned to the position, from now on called Huirangi (initially 'Hurangi' or 'Huarangi') rather than No 6 Redoubt. In November four military settlers and a corporal were in residence, and preparations were in hand for construction of a blockhouse which was within the old redoubt or nearby (Taranaki Military Settlers Memo Book 13 Nov 1865). The blockhouse allowed a more economical garrison and provided a muster station for military settlers in the district at the Huirangi town site. On 25 September 1866 the remaining men on wages at the post were ordered to lock up the blockhouse and report to New Plymouth en route for Patea (Taranaki Military Settlers Memo Book 26 Sep 1866).

From then on Huirangi Blockhouse was used only by local militia for muster parades, until the crisis of February 1869 when Captain Messenger held the post for a few weeks before it was abandoned for the last time (Taranaki Military Settlers Memo Book 4 Mar 1869). An 1869 report describes the post, with one officers' room and accommodation for 25 men, as being in "good order" (AD35/12). A site description and aerial photograph have been published in my report on fortifications of the 1860–61 war (Prickett 1994a:73).

MATAITAWA REDOUBT

On 17 October Colonel Warre was back at Mataitawa to set up a permanent post.

"On Monday last a redoubt was begun at Mataitawa, which is now occupied by 200 of the 70th, under Major Ryan. Captain Morrison's and Captain Messenger's companies hold Manutahi, and the Bushrangers are encamped at Matarakaha, on the other side of the bush behind Manutahi, where they have begun cutting the under bush preparatory to felling."

(*Taranaki Herald* 22 Oct 1864)

At the end of November troop numbers at Mataitawa were down to 150, still under the command of Major Ryan (NP Garrison Quarter Master Letter Book, 29 Nov 1864). Early in 1865 the troops were replaced by 150 Taranaki Military Settlers under Major Baddeley (NP Garrison Quarter Master Letter Book, 11 Jan 1865). In February these were reduced to 100 rank and file (NP Garrison Quarter Master Letter Book, 19 Feb 1865), and on 31 May the garrison was made up of five Royal Artillery, one Royal Engineer, two subalterns, three sergeants and 78 rank and file, T.M.S., and three Taranaki Militia (AJHR 1865 A–5:63–64).

On 4 January 1866 Lieutenant Colonel Morant of the 68th was ordered to Mataitawa the next day with a detachment of that regiment "as strong as possible" (NP Garrison Order Book). This move was to support General Chute who arrived at the post on the 25th at the conclusion of his march from south Taranaki along the inland track (see Anon 1866; and Cowan 1922–23 II:64–67). The 68th quit Mataitawa for New Plymouth on 13 February, embarking for Auckland on the same day (NP Garrison Order Book, 12 Feb 1866). Local forces then returned



Fig. 35. "Mataitawa Redoubt, Taranaki, Jan 24 1866". (Alexander Turnbull Library, Wellington).

as garrison. It is likely the post was finally abandoned when Ensign Morrison and his men were ordered to town en route for Patea in September 1866 (Taranaki Military Settlers Memo Book, 26 Sep 1866).

Figure 35 is dated 24 January 1866, and so depicts Mataitawa Redoubt the day before Chute's force emerged from the bush nearby. The anonymous artist shows the post from the north on top of the escarpment with tents, huts and some men and horses visible. The road up the hill, which follows the spur rather than the present line of Elsham Road, can be seen on the left.

Mataitawa Redoubt is close to Elsham Road at the top of the hill which rises from Richmond Road (Fig. 36). The 43 m square work with 6 x 6 m flanking defence on all four corners is easily made out in a ploughed paddock despite damage (Fig. 37). The old access road can be seen running up the spur to the north-east angle. Other lines mark later cultivation.

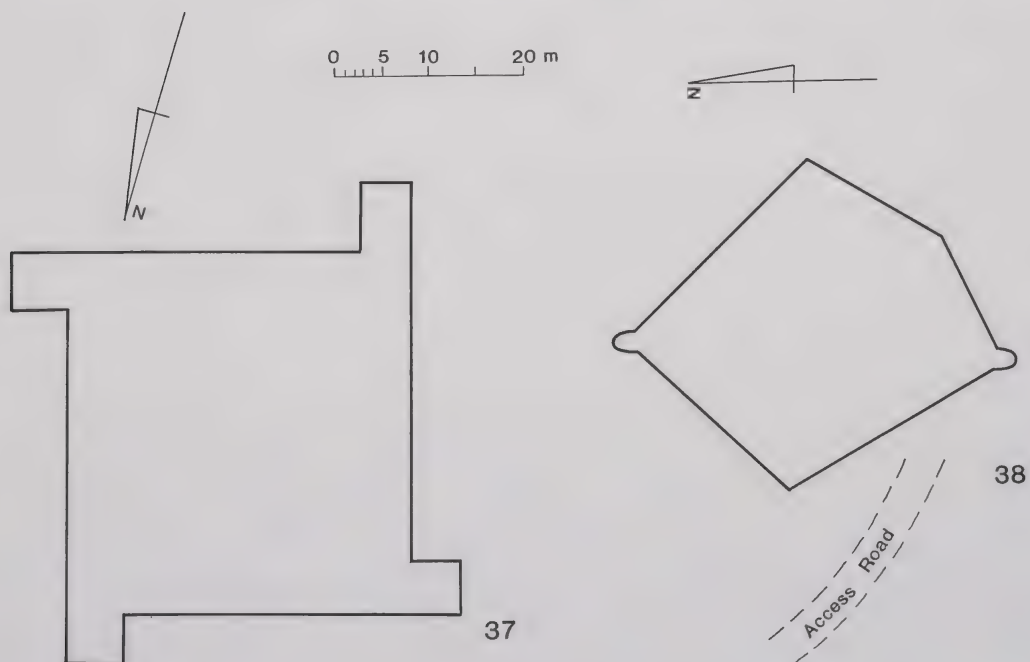
MANUTAHİ REDOUBT

Manutahi Redoubt also dates from 17 October 1864. It was established and first garrisoned by two companies of Taranaki Military Settlers under Captains Morrison and Messenger (*Taranaki Herald* 22 Oct 1864), on 20 October numbering five officers, eight sergeants and 150 men (NP Garrison Quarter Master Letter Book, 20 Oct 1864). Early in 1865 the garrison was down to 75 men (NP Garrison Quarter Master Letter Book, 11 Jan 1865), and on 19 February was further reduced to "not less than" 50 rank and file (NP Garrison Quarter Master Letter Book, 19 Feb 1865). On 31 May 1865 Manutahi was held by two subalterns, three sergeants, one drummer and 54 men, T.M.S. (AJHR 1865 A-5:63-64).

A letter from Lieutenant Clarke, Deputy Assistant Quarter Master General in New Plymouth, to Lieutenant Ferguson, R.E., refers to an addition to the redoubt a few days after it was first put up.



Fig. 36. Maitai Redoubt, 1975.



Figs 37–38. Redoubt plans. 37. Maitai Redoubt. 38. Matakara Redoubt.

“The Redoubt at Manutahi being too small for the number of men intended to occupy that Post I am directed to request you will increase it by adding to the present redoubt a large square flank, so as to admit of the whole of the Tents being with the Parapet.”

(NP Garrison Quarter Master Letter Book, 28 Oct 1864)

It seems likely a stockade was added early in 1865 (NP Garrison Quarter Master Letter Book, 8 Dec 1864). Early in 1865 a blockhouse was built close by; later references are to this and not to the 1864 redoubt. Lieutenant Ferguson placed the blockhouse: “...about 50 yards South of the redoubt, keeping the top of the gentle rise which runs from the redoubt towards the old Maori works” (AD1, 65/17).

The “Redoubt” and “Block House on Old Pa” are marked on a 1906 plan “Township of Lepperton/ Paritutu Survey District”, and on the survey blocksheet (Paritutu VII; the field plan is in Fieldbook W.3, p. 50, DOSLI, New Plymouth). Both were just off Richmond Road in Lepperton. The redoubt was *ca* 100 m north-west of the store. The blockhouse was 150–200 m south of the redoubt, behind Lepperton School. No evidence has been found at either site. Lepperton is one of two surviving townships laid out in the 1860s for the Taranaki Military Settlers; the other is Okato south of New Plymouth.

MATAKARA REDOUBT

Matakara Redoubt was third post established in the district on 17 October 1864. In contemporary accounts alternative spellings are Mangakara, Mataraha, Mataikara and even Mataraka. Matakara was located, “... on the other side of the bush behind Manutahi” (*Taranaki Herald* 22 Oct 1864), to secure communication between Manutahi and Mataitawa and to act as a base for working parties cutting down the bush between those two posts. At first it was held by Bushrangers under the command of Major Atkinson, the garrison on 20 October being one field officer, 6 officers, 8 sergeants and 105 rank and file (NP Garrison Quarter Master Letter Book).

On 8 December 1864 orders were given for the construction of a stockade: “... required to accommodate an officer and 30 Rank and File with a Store Room and magazine” (NP Garrison Quarter Master Letter Book). There were probably no permanent buildings at the post (AD31/24). By January 1865 the Bushrangers had been replaced by a company of Military Settlers (NP Garrison Quarter Master Letter Book, 11 Jan 1865,) under Captain Carthew (*Taranaki Herald* 25 Feb 1865). Next month the garrison was down to 50 rank and file, T.M.S. (NP Garrison Quarter Master Letter Book, 19 Feb 1865). On 15 July 1865 orders were given for the post to be abandoned (AD31/24).

The remains of Matakara Redoubt are 50 m west of Richmond Road, on a low rise between the high ground – and Mataitawa Redoubt – to the south, and the Waiongana Stream – and Manutahi – to the north (Fig. 39). The 35 x 35 m fort has an unusual plan with small bastions at two angles covering four sides of a five-sided work (Fig. 38). Outside, below the entrance gateway, is typical field evidence for a small group of soldiers’ huts dug into the hillside. The site has been damaged by cultivation.

MATAITAWA BLOCKHOUSE

Mataitawa Blockhouse dates from soon after the establishment of Mataitawa Redoubt. Colonel Warre gives the reason for the new post in a letter dated 19 November 1864.



Fig. 39. Matakara Redoubt, 1975.

“...in order to cover the whole of the immediate vicinity of Mataitawa, it would be necessary to have a Blockhouse at Wharuanga, about 1/2 a mile to the east of Mataitawa, across a deep gully, the country between Wharuanga & Pukerangiora (Te Arei) being more or less under cultivation, and yet completely concealed by the ridge on which Wharuanga is situated, from the proposed stockade at Mataitawa.”

(NP Garrison Quarter Master Letter Book)

The blockhouse was built early in 1865. For some time the redoubt and blockhouse were both in use (Taranaki Military Settlers Memo Book, 4 Oct 1865). The new post was occupied only by local forces. When the redoubt was abandoned in September 1866 the blockhouse remained in occupation as Military Settlers became established on their land.

On 26 September 1866 Private Dowdell, apparently the only occupant, was ordered to lock up Mataitawa Blockhouse and proceed to town en route for Patea (NP Garrison Quarter Master Letter Book, 26 Sep 1866). The post was again occupied in October but closed up in February 1867 (NP Garrison Quarter Master Letter Book, 13 Feb 1867). On 21 December 1868 Armed Constabulary and Militia under Captain Kelly were ordered to Mataitawa, to “...put the Blockhouse and ditch at that place and Manutahi in a thorough state of defence” (Taranaki Militia and Volunteers Order Book).

Mataitawa Blockhouse was reoccupied by a sergeant and six men of the Bushrangers on 15 February 1869 in response to the White Cliffs scare (Taranaki Militia and Volunteers Order Book). The next day Ensign Johnson was sent to the post with orders to make up the number to 25 men from the settlers of the district (Taranaki Military Settlers Memo Book, 16 Feb 1869). Thereafter the garrison at Mataitawa and other posts was steadily reduced. In District Orders, 9 October 1869:

“R.W. Ardlie is appointed Lance Corporal and will be obeyed accordingly, and will take

charge of Mataitawa Block House and visit Manutahi and Sentry Hill Post, at uncertain times, and see that no poultry, calves &cs are kept in the Blockhouse or enclosure and report occasionally as to the state they are kept in..."

(Taranaki Militia and Volunteers Order Book)

The remaining men at Mataitawa were struck off pay on 21 December 1869 (Taranaki Militia and Volunteers Order Book, 20 Dec 1869).

Mataitawa Blockhouse was at the old military settlers' Mataitawa town site on Richmond Road. The location is given on the Paritutu VII Blocksheets (DOSLI, New Plymouth; the original field sketch is in Fieldbook W.1, p. 42). The site was formerly occupied by a Maori kainga called Waruanga (WO 0270.I: opp. p. 132). Other spellings are Wharuanga and Waruhanga. A surveyor's fieldbook gives a plan of "Te Waruhanga BlockHouse" with measurements given in links, and a sketch of the work (Figs 40 and 41). The post was made up of two buildings with a narrow yard between, enclosed by a rectangular stockade 15.5 x 14.9 m. At two opposite corners 2 x 3 m flanking angles covered all four sides.

The site survives as an earth platform 4 x 6.5 m surrounded by a shallow ditch, 50 m south of Richmond Road, 500 m south of the junction with Cross Road (Fig. 32). Flanking defence is just discernible. The site has suffered greatly from cultivation over the years.

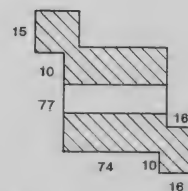
RETURN TO TATARAIMAKA

Having pushed the northern frontier to the forest edge and Waitara River, European military authorities now returned their attention southwards. By the winter of 1864 farm land behind New Plymouth was secured by blockhouses, and the southern frontier was held from Oakura to Kaitake. The next move was re-occupation of Tataraimaka, begun by the return to St George's Redoubt on 24 November 1864 (described above), and the establishment of the nearby Timaru Redoubt the following day.

Early in 1865 a blockhouse was built at the inland end of the Tataraimaka Block, and British troops pushed on to the north bank of Hangatahua (Stoney) River preparatory to military settlers taking up confiscated land in the Okato district. The story of these posts falls outside the years covered here.



40



41

Figs 40–41. Mataitawa Blockhouse. 40. Redrawn from a sketch by S.P. Smith in Fieldbook W1, DOSLI, New Plymouth. 41. Plan redrawn from Smith fieldbook. Measurements in links (1 link = 7.92 inches).

TIMARU REDOUBT

Timaru Redoubt was thrown up on the north bank of the Timaru River on 25 November 1864. Colonel Warre wrote in his diary,

“...after seeing the Camp pitched [at St George’s Redoubt] & giving Major Colvile his instructions I returned with Clarke – Ferguson &c to Huirangi where I pointed out to Capt McKellar the site for his Redoubt & directed his Company to move there tomorrow.”
(Journal, 24 Nov 1864)

Warre’s “Huirangi” was actually Hauranga, a Maori settlement situated below the redoubt site on the present sand dune area at the mouth of the river. Hauranga was occupied by Maori throughout the early 1860s, and was described in 1864 as “Meiha or Big Jack’s pa”. There is a pencil sketch of the palisaded settlement on page 39 in the Warre sketchbook, Alexander Turnbull Library. Taranaki Museum holds a watercolour by the same artist.

Colonel Warre reported to the Deputy Quarter Master General, Auckland, that,

“A Company of the Military Settlers (Otago Contingent) under command of Captain McKeller, T.M.S., has also occupied ground on the right bank of the Timaru River which post secures safe communication between Oakura & Tataraimaka.”
(NP Garrison Quarter Master Letter Book, 28 Nov 1864)

Captain McKellar’s company was made up of two subalterns, four sergeants, one drummer and 81 rank and file. The redoubt was occupied throughout by Captain McKellar’s company.

The temporary nature of the post is shown in a letter from Lieutenant Clarke, Deputy Assistant Quarter Master General, New Plymouth, to Lieutenant Colonel Lepper, commanding local forces:

“...I am advised to inform you, that, as the Post at the Timaru River will probably be abandoned as soon as the troops move forward to the Stony River (Hangatahua), Colonel Warre considers it to be hardly worth while digging a well.”
(NP Garrison Quarter Master Letter Book, 16 Jan 1865)

In the event Timaru was abandoned when its garrison took up land at Tuahukino, near Oakura (NP Garrison Quarter Master Letter Book, 18 Apr 1865).

Timaru Redoubt was on the coastal terrace east of the Timaru River mouth. Today’s Weld Road runs through the centre of the work at the point where the gravel road begins. Earthworks can be seen on both sides of the road (Fig. 42). The redoubt is of classic plan, *ca* 24 m square, with 8 x 5 m flanking defence on two corners covering all four sides (Fig. 43). The ditch is in good condition under macrocarpa trees east of the road and in one paddock on the other side, but the north–west sector has been damaged by cultivation. Flanking defence at the north–west angle is distinct despite damage and we may be confident that it is matched at the opposite angle where it disappears under a boxthorn hedge.



Fig. 42. Timaru Redoubt, 1975.

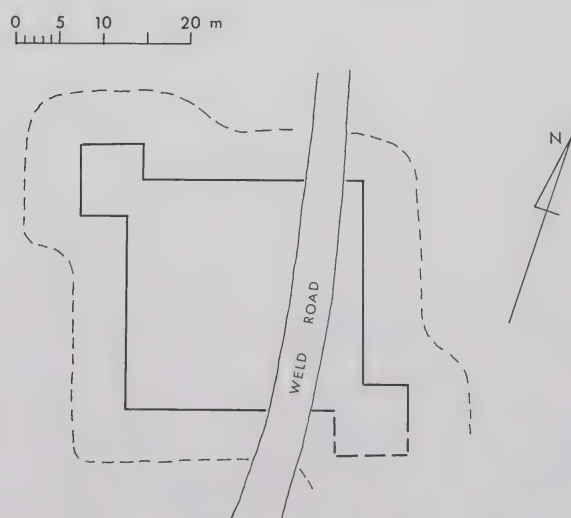


Fig. 43. Plan of Timaru Redoubt.

THE BRITISH WAR IN TARANAKI

THE FORTIFICATIONS

British Army and colonial fortifications in New Zealand fall into three groups: earthwork redoubts, and wooden stockades and blockhouses (all described in Prickett 1994b). Of the 20 north Taranaki works described here ten were redoubts only, three had a combination of earthwork and stockade defence, three or more were blockhouses only, and the rest employed various combinations of blockhouse and stockade defence.

Earthwork redoubts were St Patrick's, St George's and St Andrew's, Pahitere, Kaitake, Te Arei, Mataitawa, Manutahi, Matakara and Timaru. Manutahi and Matakara were altered to incorporate some stockading a few months after first being established as earthwork fortifications.

The works thrown up at Poutoko, Tataraimaka and Oakura in the first autumn of renewed fighting in Taranaki were all of the so-called 'New Zealand redoubt' form (Young 1869), with flanking defence at all four corners each covering one side. Mataitawa Redoubt is another example, as is Te Arei if we overlook the east face which makes use of the cliff to the Waitara River.

The 'New Zealand redoubt' was not used in the Taranaki war of 1860–61. The trace was adopted from the outset of renewed fighting of 1863, however, and was widely used in the years following to be given its epithet by Captain H.W. Young at the end of the decade. The question must be asked, where and how the form was developed. It is possible that credit is due to the much criticised Royal Engineer Lieutenant Ferguson, who laid out St Patrick's Redoubt at the outset of the campaign. St George's Redoubt, on the other hand, was the responsibility of Major Frederick Mould who was engineer in charge of many works in the First Taranaki War where the 'New Zealand redoubt' did not appear. It does seem likely therefore that there was some general discussion of suitable works for New Zealand campaigning in the years before fighting flared up again, and that the new trace was a result.

Young in fact criticised the trace because the outer faces of corner bastions were not covered, and because it did not allow a concentration of fire on a point under attack. An advantage was that its simplicity made it easy to lay out. Also, having three angles at each corner made for greater strength than was the case at corners with five angles, required by works which defended four sides from just two corners (as at Timaru Redoubt). A trace which allowed concentrated fire on a point under attack was really designed for works which might be breached by artillery, which was not the case in New Zealand.

Timaru Redoubt marked a return to the classic form of rectangular trace with all four sides defended from just two corners. This form was used at Waireka in winter 1860 (Prickett 1994a:41–53), and also continued in use to the end of the decade, in later years employed mostly with loopholed blockhouses at the bastions (as at Manaia, Prickett 1994b:15–16).

The shape of other 1863–64 Taranaki redoubts depended on the circumstances of topography. At Pahitere a rectangular platform was developed from the earthworks of an older pa. This was also so at Kaitake, although here nothing remains of the older work beneath the European work. The trace at Kaitake also depended upon the narrow ridge on which the work was placed. The five-sided trace of Matakara Redoubt probably shows the later stockade defences; certainly, the bastions at the north and south angles are too small to have been formed by earthwork parapets.

Sentry Hill Redoubt was a simple rectangle. Like the earthwork at nearby Mahoetahi it had the advantage of commanding height from the top of a volcanic lahar. The irregular

Mahoetahi work depended entirely on the cut down shape of the hill (and old pa). Sentry Hill and Mahoetahi employed complementary earthworks and nearby stockades, partly for flanking defence and partly to house larger garrisons than were originally intended.

The earthwork defence at Fort Robert included a stockade for part of its perimeter. This also appears to have been the case at St George's Redoubt. Here it may have been for defence against the weather as much as anything else – as at the 1865 Warea Redoubt further down the coast, where excavations revealed a line of large posts immediately within the seaward parapet (Prickett 1994b:100, 103). How much Manutahi and Matakara redoubts were altered to stockades is not known. Kaitake Redoubt may have employed stockade defence along its short uphill side.

Stockades include 'Lower Kaitake Blockhouse', 'Poutoko Blockhouse' and 'Mataitawa Blockhouse', all consisting of barrack buildings within a stockade defence, as well as the independently defensible works at Mahoetahi and Sentry Hill. As has been pointed out Manutahi and Matakara were given some stockade defence after being first set up as redoubts. There was partial stockade defence also at Fort Robert and St George's Redoubt, Tataraimaka.

Stockades at Mahoetahi and Sentry Hill were rectangular partially flanked works. Sentry Hill appears to have had small towers at two angles for flanking defence (Fig. 20). Inside the work at Mahoetahi were one or two barrack buildings. At Mataitawa Blockhouse there were also barrack building inside, presumably loopholed for defensive fire through the stockade which fitted against the barrack walls. The barracks used here, and throughout the 1860s campaigns, were of similar construction to those shown in the Nicholl photographs of St Andrew's, Pahitere and Kaitake. Poutoko and Lower Kaitake Blockhouse were probably of this form of 'blockhouse' enclosed within a defensive stockade. Allen's Hill may have been as well.

Blockhouses in the so-called 'New England style' (Prickett 1994b:15) were put up to secure European farmland behind New Plymouth in early 1864. These were square buildings of two storeys with upper floor overhanging the lower. Small garrisons could be quickly relieved by troops from town. Defensive arrangements are supplemented by what looks like an earth parapet at Ratanui (Fig. 30), and a ditch with drawbridge at Dingle's Blockhouse (Fig. 26). Only Puketotara depends on the blockhouse alone (Fig. 31).

THE STRATEGY OF OCCUPATION

The 20 works described here were put up by British Army and colonial forces in the opening phases of a prolonged struggle for control of north Taranaki. The fighting which began in autumn 1863 continued until early 1866 when final skirmishes took place in forest country south of Stoney River. In 1869 the armed struggle was renewed at Pukearuhe where Maori from north of Parininihi (White Cliffs) killed all of a small remaining garrison, and provoked a considerable European military response north of Waitara River. A decade later Armed Constabulary and militia advanced on Parihaka to destroy the remaining independent Maori authority in the province.

The Second Taranaki War of 1863–66 and campaigns which followed may be distinguished from the war of 1860–61 by the manner and success of European strategy. In the first war there was no way by which European forces, or indeed, Maori, might translate success in the field into the achievement of political objectives. The New Zealand Settlements Act brought about a radical change. The way was open for land belonging to 'rebel' tribes to be confiscated and settled by European farmers, thus gaining the political objective of more land and at the same time denying Maori the resources to continue fighting.

Military settlers began arriving in Taranaki even before parliament enacted the legislation that was to give them confiscated land. In October 1863 men who had been recruited in Otago were posted to Fort Robert with a view, at least partly, of commencing cultivation. Ironically this was on land in the possession of Ropata Ngarongomate of Poutoko who was a staunch ally of the Pakeha. From 1864 confiscation became more systematic with companies of military settlers placed on surveyed land which was balloted out according to rank.

War began in autumn 1863 ostensibly with the limited aim of recovering the Tataraimaka Block lost to Maori forces in 1860. St Patrick's and St George's Redoubts were both located on European land. Only after the ambush of troops on Oakura Beach was Andrew's Redoubt placed on Maori land to secure the road south. The withdrawal from Tataraimaka in winter 1863 was a temporary setback, brought about by the removal of troops to Auckland for the Waikato war. From early 1864 European campaigning in north Taranaki was aimed at progressively excluding Maori fighting strength from the district.

After Waitara and Mahoetahi were abandoned in May 1863 Bell Block Stockade (Prickett 1994a: 10–13) was the only European post north of New Plymouth until the advance on Sentry Hill in February 1864. Strong garrisons at Mahoetahi and Sentry Hill gave security to abandoned European farmland in the Bell Block district and put pressure on inland Maori settlements. The significance of the move to Maori is demonstrated by the assault on Sentry Hill Redoubt on 30 April where as many as 50 attackers were killed.

Military authorities now turned their attention south of New Plymouth. Two weeks after the move to Sentry Hill, St Andrew's Redoubt was reoccupied and Pahitere Redoubt established nearby for military settlers. The objective was eviction of the enemy from positions in the Kaitake Ranges which posed a threat to European farmland behind New Plymouth. This was achieved by the end of March 1864. The military frontier between Oakura and Kaitake Redoubt greatly eased the security situation in the neighbourhood of New Plymouth. Blockhouses encouraged farmers back to their land.

In spring the focus shifted to Manutahi and Mataitawa. The purpose here was to evict Maori who posed a threat to European forces and settlement in north Taranaki, and to block off the Whakaahurangi Track by which enemy reinforcements were able to enter the region from the south. The process of isolating the Maori struggle in north Taranaki was completed when Pukearuhe was occupied in autumn 1865 to stop off the coastal route from the north.

The last fortification covered here signals a return to the south. Timaru Redoubt was thrown up when Tataraimaka was reoccupied in November 1864. Early the next year troops marched forward to the north bank of Stoney (Hangatahua) River and a blockhouse was erected at the inland end of European land at Tataraimaka to encourage farmers back to their land. The move to Stoney River marked the limit of effective confiscation of Maori land south of New Plymouth until the Parihaka Campaign of 1880–81.

In north Taranaki the confiscation of land was effectively employed as a winning strategy in the armed struggle between Pakeha and Maori. The campaigns which extended from 1863 to early 1866 represent a systematic and coherent push out of New Plymouth to claim both victory and the land. Maori reinforcements were excluded from the region in a series of European moves in autumn, spring and autumn 1864–65, which fitted into a larger pattern of alternate advances north and south of New Plymouth.

Sometimes British troops and military settlers advanced in tandem, occupying complementary positions to enable the settlers quickly to take up their land. This can be seen at St Patrick's Redoubt and Fort Robert in 1863, in March 1864 at St Andrew's and Pahitere, also at Mataitawa and Tataraimaka later that year. As military settlers took up their farms, fortified positions at town sites gave reassurance and security.

In the years after 1863 the fate of Taranaki was decided as land forcibly taken from its previous owners was transformed by European farmers. The 1880–81 campaign against Maori self-government at Parihaka was the end and logical conclusion of the process. Virtually the whole of the rich lowlands of coastal Taranaki was now in Pakeha hands. European fortifications which survive as archaeological sites tell of the course and success of the strategy of confiscation.

Acknowledgements. My foremost debt is to Kath Prickett. An aerial survey of a gas pipeline route which she undertook first revealed many of these sites, and so caught my interest. Later we visited them on the ground. Others who have helped in different ways include Ron Lambert, Alastair Buist, Robyn Oliver, Roger Fyfe, Kelvin Day, staff of the former Department of Lands and Survey, New Plymouth, and of Taranaki Museum and the New Plymouth Public Library.

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APPENDIX 1. New Zealand Archaeological Association site record numbers and map references. Approximate map references are given where the location is known but archaeological evidence has not been found.

Allen's Hill Blockhouse P19/32 *ca* 975332
 Dingle's Blockhouse P19/155 017336
 Fort Robert P19/20 954336
 Kaitake Redoubt P19/37 936296
 Lower Kaitake Blockhouse P19/45 *ca* 934296
 Mahoetahi Stockade Q19/118 140418
 Manutahi Redoubt Q19 *ca* 147374
 Mataitawa Blockhouse Q19/155 163354
 Mataitawa Redoubt Q19/162 156353
 Matakara Redoubt Q19/161 153362
 No 6 (Huirangi) Redoubt Q19/147 179384
 Pahitere Redoubt P19/23 940323
 Poutoko Blockhouse P19 *ca* 969336
 Puketotara Blockhouse P19/160 059359
 Ratanui Blockhouse P19/161 041335
 St Andrew's (Oakura) Redoubt P19/38 930325
 St George's (Tataramaka) Redoubt P19/44 869296
 St Patrick's (Poutoko) Redoubt P19/19 963338
 Sentry Hill Redoubt Q19/166 *ca* 138400
 Te Arei Redoubt Q19/163 193270
 Timaru Redoubt P19/43 900307

T.F. CHEESEMAN'S DIARY OF A BOTANICAL VISIT TO RAROTONGA, COOK ISLANDS, 1899

B.J. GILL AND W.R. SYKES

Abstract. T.F. Cheeseman, Curator of the Auckland Institute and Museum, visited Rarotonga in 1899 to study the flora. He kept a narrative diary, distinct from his field notebooks, which is transcribed here. It begins with the departure from Auckland on 9 May and ends abruptly with the entry for 3 July, near the end of the expedition. The diary details daily excursions to collect plants, traces Cheeseman's unfolding knowledge of the plants and vegetation, and describes some aspects of life on turn-of-the-century Rarotonga. Nine of Cheeseman's photographs of the expedition are reproduced.

Thomas Frederic Cheeseman (1845-1923) was born in Hull, Yorkshire, and came to New Zealand as a child with his parents (Goulding 1996). University training was then unavailable in New Zealand, but Cheeseman followed an interest in plants to become a self-taught botanist. In 1874 he was appointed sole Curator of the Auckland Institute and Museum collection, which position he held until his death (Powell 1967). Cheeseman married Rose Keesing (1857-1931) in 1889.

Cheeseman travelled to Rarotonga in 1899, accompanied by his wife, to collect herbarium specimens and study the flora (Cheeseman 1903). He kept a narrative diary of the expedition (Auckland Institute and Museum Library MS58, box 21, notebook 23) and this is transcribed below.

Rarotonga is 3,000 km north-east of New Zealand. The London Missionary Society was influential in the area from the 1820s and Rarotonga was declared a British Protectorate in 1888 (Douglas & Douglas 1994). With surrounding islands, it was transferred to New Zealand jurisdiction as the Cook Islands in 1901, soon after Cheeseman's visit.

THE DIARY

The Rarotonga diary is in an exercise book separate from Cheeseman's field notebooks, and entries are in ink. Cheeseman's writing is neat and fairly easy to read. The transcription below is almost completely verbatim. The dates at the start of each entry, sometimes written by Cheeseman as "May *n*" and sometimes as "May *n*th", have all been transcribed as "*n* May". All Latin names of plants have been set in italics whether Cheeseman underlined them or not. All question marks in the transcript are Cheeseman's.

The diary ends abruptly with the entry for 3 July, and no account of the rest of the trip exists in the Museum's Cheeseman collection (MS58). However, we know from Cheeseman (1903) that the trip to Rarotonga ended in July. Cheeseman sought to collect all the wild species but was greatly held up by wet weather and his specimens were not drying well. He may have been too pressed for time to keep up the diary.

Figs 1 and 2 show place names mentioned in the diary. Current Latin names of plants, and Latin equivalents of Cook Islands Maori names of plants, are given in Appendix 1.

The journey by sea from Auckland to Rarotonga took a week. In the narrative his acquaintance with the Rarotongan flora unfolds day by day as he discovers species new to him. The diary contains descriptions of the vegetation, and detailed descriptions of the arrival at

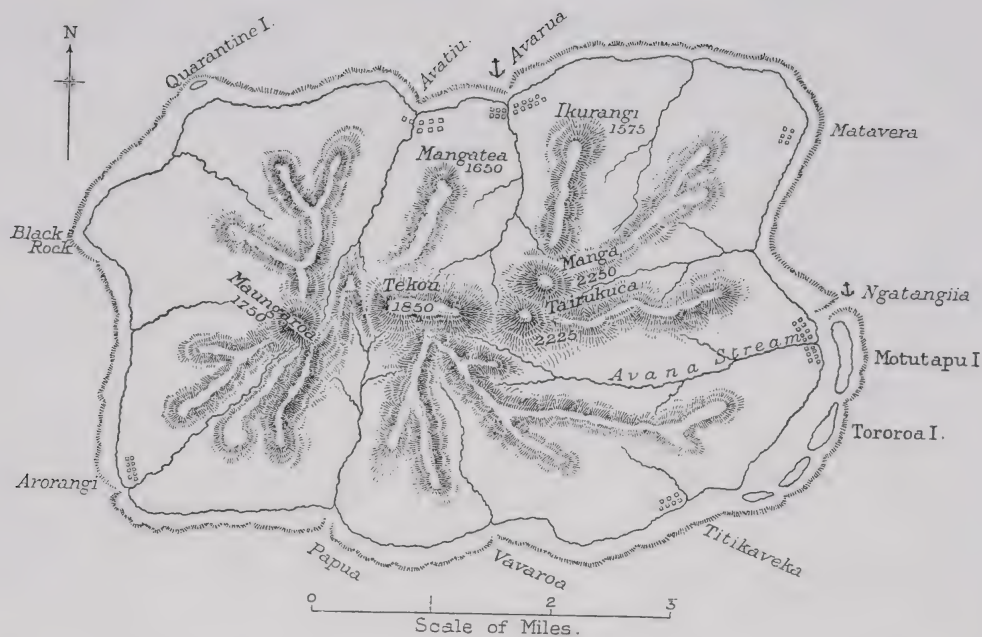


Fig. 1. Map of Rarotonga reproduced from Cheeseman (1903). "Outline from the Admiralty Chart; interior from rough sketches by T.F. Cheeseman."

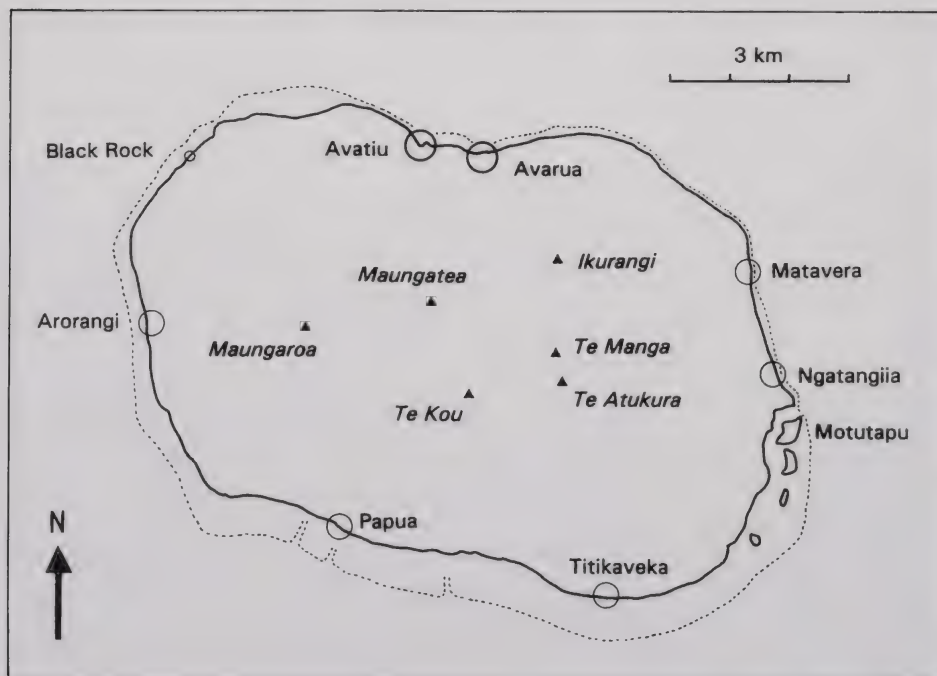


Fig. 2. Contemporary map of Rarotonga showing place names mentioned in the text.

the port of Avarua (16 May) and the home and surroundings where Cheeseman stayed at Arorangi (17 May). Also of interest are descriptions of the "native settlement of Arorangi" (20 May), a method employed by boys to catch wild roosters in the bush (2 June) and details of the size and construction of irrigated taro plantations (1 July).

Cheeseman "... travelled round the island, ascended all the mountains, and practically visited every portion of it ..." (Cheeseman 1903). "The mountainous interior of the island is seldom visited" on account of the "... total absence of tracks, the steepness of the hills, and the dense jungle-like forest ...". It "... is most unusual for either natives or Europeans to climb any of the mountains, and I was assured that the highest peak, Mount Taitukura [= Te Atukura, the second highest peak; Table 1], had not been ascended for at least eight years previous to my visit" (Cheeseman 1903).

The diary describes the ascent of Ikurangi (28 May), Te Kou (18 June), and Maungatea (25 June). Maungaroa was attempted on 30 May but the summit was not reached until a second attempt on 2 June, when the highest point was reckoned at 1650 ft. (This figure is confirmed by the entry for 18 June where the summit of Te Kou is described as "1850 ft, or 200 ft higher than Maungaroa." Cheeseman's sketch map (Fig. 1) shows Maungaroa to be 1750 ft, presumably an error since 1650 ft is closer to the actual height.) No accounts are given of trips to the summits of Te Manga and Te Atukura. These must have taken place after 3 July when the narrative ended. The heights of peaks estimated by Cheeseman using an aneroid altimeter compare very closely with the heights measured by modern means (Table 1).

Cheeseman took photographs on Rarotonga (e.g. 21 May). In 1993, Auckland Museum Library received from a descendant of Cheeseman (Miss Patricia Grant-Taylor) some old photographs that included a series of 33 prints showing tropical scenes (Thomas F. Cheeseman photograph collection, 93/8). They are without captions but appear to be some of Cheeseman's Rarotonga photographs, and nine are reproduced here (Figs 4-12). Fig. 13 shows a stone pounder collected by Cheeseman on Rarotonga.

BOTANICAL BACKGROUND

By 1899 there had been over a century of botanical collecting in the tropical Pacific and numerous specimens had been taken to Europe and the United States from many parts of Polynesia and Melanesia. Major collections existed for the larger island groups (notably

Table 1. Heights of the main peaks of Rarotonga as estimated by Cheeseman (1903) and as measured today (taken from map "Rarotonga" 1985, NZMS 272/8/6, Dept. of Lands & Survey, Wellington).

Peak	Cheeseman (1903) ft (m)	Modern measurement m
Manga (= Te Manga)	2250 (686)	653
Tairukuca (= Te Atukura)	2225 (678)	638
Tekou (= Te Kou)	1850 (564)	588
Mangatea (= Maungatea)	1650 (503)	523
Maungaroa	1650 (503)*	509
Ikurangi	1575 (480)	485

* See discussion in text.

Vanuatu, Fiji, Tonga, Samoa, the Society Islands and Hawaii) and several published floras had ensued. However, there were many gaps, including knowledge of the botany of the Cook Islands and of much of French Polynesia beyond the Society Islands. Before Cheeseman's visit to the Cooks only a handful of plant specimens had been collected. W.B. Hemsley of Kew Gardens wrote to Cheeseman on 5 January 1898 (Auckland Institute and Museum Library MS58, box 8, folder 4): "I have spoken to the Director about your proposed visit to the Cook Islands for the purpose of botanical investigation, and he agrees with me that it is very desirable ... So far as I can ascertain no trained botanist [h]as ever visited the islands, and the number of species of (dried) plants that have reached Kew in a condition for determination does not exceed three dozen, chiefly ferns."

Before going to Rarotonga, Cheeseman may have been able to study the several regional floras then published. *Flora Vitiensis* (1865-73) by Berthold Seeman became one of the most important background works for botanical studies in the tropical South Pacific. Even more relevant to Rarotonga was *Flore de la Polynésie Française* (1893) by E. Drake del Castillo, and the same author's *Illustrationes Florae Insularis Maris Pacifici* (1886). Cheeseman may have seen W. Hillebrand's *Flora of the Hawaiian Islands* (1888), and almost certainly knew W.B. Hemsley's *The Flora of the Tonga or Friendly Islands* (1894). Finally, Cheeseman may have known F. Reinecke's accounts of Samoan plants in *Botanische Jahrbücher* (1897, 1898) although only a small proportion of the species had descriptions.

Apart from a visit to the Kermadec Islands in 1887 (Cheeseman 1888), the Rarotongan expedition was Cheeseman's only botanical foray beyond New Zealand. It is unclear how much Cheeseman knew of the flora of Rarotonga before his visit, but his diary shows that he already had a good basic knowledge of tropical Pacific plants. He changed many names between the diary and the published flora (Cheeseman 1903), presumably as a result of correspondence with botanists in Europe, particularly at Kew Gardens. But for the flora he often had simply to add a specific epithet to the generic name used in the diary.

Cheeseman collected herbarium specimens of virtually all the wild Rarotongan higher plants that he encountered, some 334 species. The bulk of the specimens are held in the Auckland Museum herbarium (AK; E.K. Cameron, pers. comm.). Cheeseman acknowledged W.B. Hemsley at Kew (K) for examining and comparing specimens (Cheeseman 1903: 207), C.H. Wright at Kew for examining his new fern specimens (Cheeseman 1903: 309) and E. Hackel at Vienna (W) for examining and determining a set of Rarotongan grasses (Cheeseman 1903: 302). These duplicate specimens would have remained with the overseas specialists. Fig. 3 shows one of Cheeseman's new species, *Homalium acuminatum* (Flacourtiaceae), which is represented in AK by 11 sheets. Cheeseman collected some lower plants on Rarotonga and of these AK holds 19 moss collections, representing at least 17 taxa. Most of these are ex T.W.N. Beckett herbarium, determined by V.F. Brotherus in 1902. The Beckett herbarium at Lincoln (CHR) holds other Cheeseman Rarotongan moss specimens.

Of the 18 species of plants that Cheeseman considered to be Rarotongan endemics, 15 were described in his flora (Cheeseman 1903): nine by Cheeseman himself (one fern, one monocotyledon, seven dicotyledons), two grasses by Hackel and four dicotyledons by Hemsley. Four species bear Cheeseman's name: a dicotyledon, two grasses and a recently-described fern.

TRANSCRIPT OF THE DIARY

Tuesday, 9 May. Left for Rarotonga on the steamer *Ovalau*¹, casting off from Queen St. Wharf at quarter to nine pm. Only six passengers on board – Madame Arnaud and her



Fig. 3. Herbarium sheet AK 24967, *Homalium acuminatum* Cheeseman (syntype). Photo: N. Payne.

daughter, two Tahitians returning to their country after a visit to New Zealand; Mr Hemus [spelling uncertain], in the employ of Messrs Donald & Edenborough; another passenger, whose name I failed to learn; and myself and wife. The night was fine but dark, and after the steamer had rounded the North Head we both returned to our cabins.

Wednesday, 10 May. A beautifully fine day, with hardly a ripple on the water. Numerous albatrosses and Mollymauks followed in the wake of our vessel, and an occasional black petrel

was also seen. No incident worth mention occurred during the day. Towards evening the wind shifted to the eastward, but still continued light.

Thursday, 11 May. Gloomy and cloudy during the whole of the day, with light N.E. breeze. Towards the evening a dense bank of clouds appeared in the North, and the general impression on board was that a N.E. breeze would be encountered on the following day. Numerous albatrosses still following in our wake. Expected to see flying fish, but none was noticed.

Friday, 12 May. On awaking in the morning found that we were running before a strong S.W. breeze, with sails set to help us on. The breeze freshened during the day, and seemed to have the effect of increasing the number of albatrosses and small petrels following in our wake. Towards night the wind drew more into the West, raising a beam sea, making the Ovalau roll rather disagreeably.

Saturday, 13 May. W. breeze the whole day, with high beam sea. Still plenty of albatrosses and petrels.

Sunday, 14 May. Much finer. Light N.W. breeze, and sea much smoother. We now commenced to feel the temperature much warmer. Almost all the albatrosses have left us.

Monday, 15 May. Light N. breeze and smooth sea. Quite warm, but cloudy; and sky not at all what one would expect to see in the tropics. All the albatrosses have gone; and the only birds seen during the day were a few tropic birds and one or two noddies and terns. Flying fish abundant during the whole of the day. They disappointed me, on account of their small size.

Tuesday, 16 May. A dull, cloudy morning, with light S.E. breeze – which I suppose must be counted as the trade wind. Rarotonga was sighted about 9 o'clock. At first only the high central peak was seen; then two others appeared, standing off like two little islands. By eleven o'clock the shape of the island could be distinctly made out. Shortly after drizzly showers came on, and continued until we had reached the south end of the island. About two the steamer anchored off Avarua harbour, situated at the northern end of the island. The weather now cleared up, and we had a good look at the island from the anchorage. High and rugged mountains were seen to occupy the whole of the central portion, with deep gorges and ravines. Many of the peaks were rocky and one remarkable column of solid rock presented a very remarkable appearance as seen from the coast a little to the south of Avarua. It must be at least 200 ft in height. Except on these steep and rocky portions the whole island, from the sea beach to the crest of the hills, was covered with luxuriant forest. Even from the anchorage one could notice that the vegetation was rich and diversified, with many varying tints of foliage. Coconut palms [= *Cocos nucifera*] were plentiful towards the coast, and alone gave the landscape a truly tropical appearance. A fringing reef runs all round the island, usually only a few hundred yards from the shore, and on the outer rim of this a line of white and foaming breakers was plainly visible. Just opposite to our anchorage were two gaps in the reef – one leading to the harbour of Avarua, the other to that of Avaiti [= Avatiu] – situated only a few miles to the southwards [actually about a mile westwards].

The anchor had no sooner dropped than we were boarded by the health officer and the custom house officers. And then some score or two of stalwart Rarotongans – tall, lithe and well-built – climbed up on the deck to offer their services for the work of discharging the cargo. We were also surrounded by quite a fleet of little outrigger canoes – each paddled by a single man. The object of this visit was evidently fishing, for as each canoe drew up under our lee, the occupant quickly had his line and hook over the side. And notwithstanding we were anchored in ten fathoms of water, we could distinctly see the bottom, and even the fish swimming to and fro.

For cultural reasons, this image has been removed.
Please contact Auckland Museum for more information.

Fig. 4. Family group, Rarotonga, 1899. Possibly Arorangi – “Numbers of gaily dressed men and women were sauntering up and down the road in front of their houses, and I secured several good photographs” (21 May). Photo: T.F. Cheeseman (Auckland Museum Library),

After our luggage had been examined and passed, we landed in the little oil launch that plies between the steamer and the shore, and soon landed on the Union S.S. Co's wharf. There were crowds of gaily dressed Rarotongan women, drawn up to see the arrivals by the steamer. We were very favourably impressed by their appearance. Tall, well-built, of graceful aspect and with much natural dignity of carriage, they welcomed us without any bashfulness or hesitation, and at the same time with a politeness and suaveness seldom seen in uncivilised man. We found that Col. Gudgeon², the British Resident, was absent on some of the other islands of the group, but we were introduced to the Rev Mr Hutchins [*sic*]³, the leading clergyman, and his wife and also a number of other residents.

Avarua township is a long straggling place extending for some distance along the road which runs all round the island a little distance from the beach. There are several stores or shops, interspersed with the residences of the natives. Most of them have patches of garden in front of them, and one saw many well-known tropical plants which had been imported from abroad. But I will reserve a description of the place until I have become more familiar with it.

We had arranged to stay with Mr & Mrs Rice, whose residence turned out to be between three and four miles distant, near a native village called Arorangi. Mr Rice welcomed us immediately on our landing, and we found he had a buggy waiting to drive us out. After a little delay, we left Avarua about 4 o'clock. The drive was a beautiful one. The road runs parallel with the coast, seldom being more than $\frac{1}{2}$ mile from it, and often much less. In many places it is lined with groves of cocoa-nuts, and here and there we passed through the cultivations of the natives – bananas, taro, kumaras, etc. But these I will describe later on. One of the most curious sights – or rather one which perhaps impressed us as much as any – was the screw pine

(*Pandanus odoratissimus*) – elevated on the top of its aerial roots. We arrived at Mr Rice's residence a little before sunset, and were glad to find a comfortable well arranged house, built with more regard to the requirements of a tropical climate than appears to be generally the case on the island.

Wednesday, 17 May. Early in the morning Mr Rice drove in to Avarua to fetch my heavy luggage, containing my drying paper and collecting apparatus. On his return I at once commenced to unpack. A work table was improvised in one of the sitting rooms, and I soon had my drying paper, boards and straps, books, microscope, dissecting instruments, etc etc, arranged in a very convenient way. A little closet proved to be very suitable for storing away my collecting bottles and photographic requisites. My tank for larger specimens in formalin, was kept on the verandah.

Mr Rice's house is a low edifice surrounded on three sides with a broad verandah. The foundations and walls are of concrete, the lime being obtained by burning the coral rocks. The windows are large and broad, and the rooms open into one another with broad openings six feet wide or more, without doors but furnished with portieres. There is consequently plenty of ventilation, an indispensable requisite in such a climate. The verandah is roofed with iron, but the house itself is covered with a paper or felt covering, painted red, fastened on a boarded roof. I understand, however, that the material had proved to be hardly suitable for the climate. Under the house is a cellar, used for keeping stores, and doubtless very useful for that purpose. The kitchen, etc, is at the back of the house, and the walls, for a portion at least, are composed of open lattice work. The sitting rooms and bed-rooms in the front are very nicely and appropriately furnished. The floors are covered with clean native matting, and the windows are protected with dark green roller blinds. Altogether the house is [a] comfortable and well-arranged residence. A Rarotongan girl, and two boys make a good set of servants, and have evidently been well and carefully trained.

The house stands east and west, facing the east. Standing on the front verandah, one looks directly at the central peaks of the island – steep ridges and sharp-pointed peaks, clothed with dense and luxuriant vegetation, excepting one or two hills, which appeared to be bare on top. At the base of the hills was the thick tropical vegetation, and in front of that a grove of coconut palms, their broad feathery foliage waving in the wind, the large yellow fruit showing in clusters just at the base of the leaves. Round the house itself is a clearing of a few acres in extent, occupied here and there with a second growth of *Carica papaya*, a very striking plant of palm-like habit, its stems loaded with the large smooth fruits. On each side is the virgin forest, here largely composed of the Puka (*Hernandia peltata*) and Utu (*Barringtonia speciosa*), both of them magnificent and umbrageous trees. From the back of the house it is only a few yards to the beach – here a wide strand of coral sand white and dazzling in the sun. A little distance from the shore – perhaps quarter of a mile – is the fringing reef which everywhere encircles the island and on which a line of snow-white breakers is incessantly rolling. Between the breakers on the edge of the reef and the shore is a stretch of calm shallow water – here and there studded with projecting coral rocks. The shore is lined with a fringe of *Casuarina equisetifolia*, through the branches and filiform leaves [actually the branchlets] of which the wind sighs with a noise reminding one of a pine forest. The undergrowth close to the sea is composed of *Scaevola Koenigii*, which forms a continuous belt a few yards in width.

Thursday, 18 May. This day I spent in collecting the plants in the immediate vicinity of the homestead – not going further away in any direction than half a mile or so. The forest, so far as its general appearance is concerned, differs chiefly from that of New Zealand in the greater luxuriance of the foliage. A much larger proportion have large leaves. The *Hernandia peltata*, *Barringtonia*, *Hibiscus tiliaceus*, *Morinda citrifolia*, *Guettarda speciosa* are all good



Fig. 5. Unidentified women, Rarotonga, 1899. The woman on the right appears in Fig. 3. Photo: T.F. Cheeseman (Auckland Museum Library).

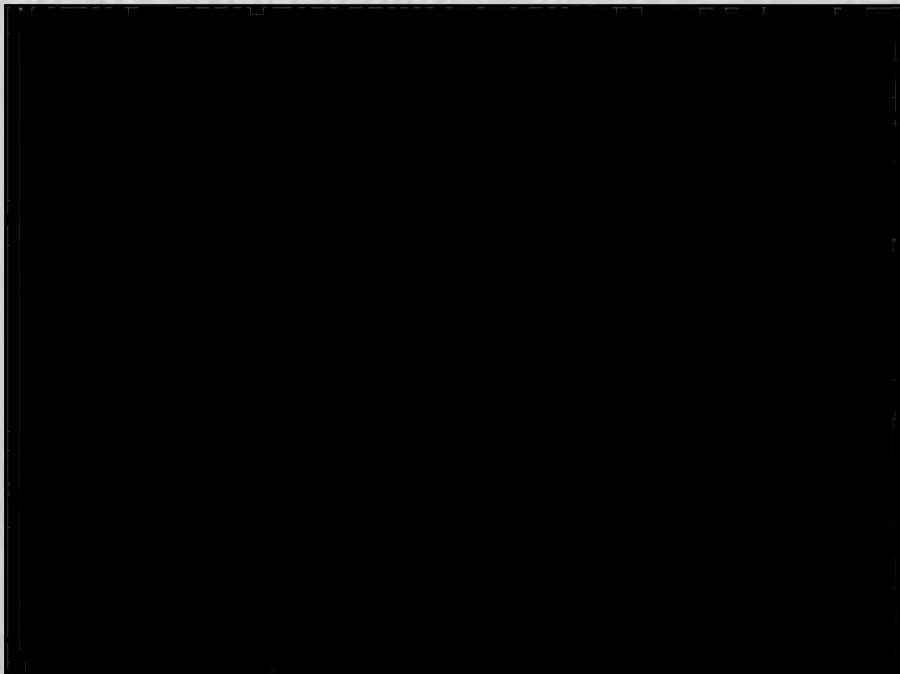


Fig. 6. Family group, Rarotonga, 1899. Probably 26 May – “In the afternoon Matthew brought his father, mother and three brothers to be photographed.” Photo: T.F. Cheeseman (Auckland Museum Library).

examples, bearing large broad showy leaves. The cultivations are covered with an assortment of weeds quite different to anything we possess in New Zealand. Two species of *Sida* are very plentiful, *Urena?*, *Ageratum*, *Asclepias curassavica*, one or two labiates, several malvaceous plants, *Eleusine indica*, *Digitaria*, *Oplismenus*, etc, are common plants.

Friday, 19 May. The weather changed early in the night, and heavy rain came down in torrents, accompanied with vivid lightning. During the day the rain was not quite so heavy, but sufficiently so to put all exploration out of question.

Saturday, 20 May. Almost the whole night the rain fell in torrents, accompanied with very vivid lightning. About sunrise the weather cleared up, and by ten o'clock the sun appeared, the rest of the day being beautifully fine. In the morning I walked to the native settlement of Arorangi, distant about a mile. It is quite a large village, stretching along the road side for a considerable distance – indeed I did not reach the end of it. On either side of the road is a low stone wall, covered here and there with a species of *Peperomia*. All the houses have little patches of cultivation in front, and I was struck with the number of tropical shrubs and flowers grown for ornament. Conspicuous among these were the Frangipani, with its large panicles of scented yellow flowers and fine bold foliage; the Gardenia, with glossy foliage and pure white scented flowers; *Hibiscus rosa-sinensis*, a scarlet and pink-flowered variety; one or two other Hibisci; an *Acalypha*, with crimson foliage, etc. etc. A very handsome tree, the Io [= tou], was also common (*Cordia subcordata*) – also a species of *Macaranga*, the native name of which was given to me as Enuā. The residence of the chief “Ariki” of the district – at present a female – was pointed out to me. It is a long two storied weather boarded house with verandah and balcony in front, and has a somewhat dilapidated appearance. Next to it is a large stone church – quite an imposing edifice, with huge windows [see Fig. 10]. It appeared to be undergoing repairs. Directly opposite was the public school, also a large building. The native houses were of all styles and sizes, from a mere hut to a comfortable looking stone or weather-board house. In the afternoon I strolled in the other direction to a place called “The Black Rocks”, where a mass of volcanic rocks runs down into the sea. Here I found some very interesting plants – *Ficus tinctoria*, a species of *Pipturus*, a violet *Ipomoea* [= *I. littoralis*], etc.

Sunday, 21 May. The morning opened fine, but before breakfast it clouded over, and heavy showers fell during most of the morning. About 11 o'clock it cleared up, and I sallied out and took a couple of photographs of the breakers on the reef. There was a heavy swell, and occasionally the height of the waves rolling and curving over on the leeward side of the reef was very great indeed. In the afternoon I walked over to Arorangi, taking my camera with me. Numbers of gaily dressed men and women were sauntering up and down the road in front of their houses, and I secured several good photographs.

Monday, 22 May. Rain again during the night, clearing up in the forenoon. After lunch drove in to Avarua with Mr Rice, and delivered some letters of introduction – Mr Van Hoff, Mr Taylor, Mr Pilz, etc etc. Collected a few plants on my way home. In the evening developed a few photographic plates.

Tuesday, 23 May. In the morning changed my plants and developed some photographic plates. In the afternoon struck inland opposite to Mr Rice's. Saw some splendid specimens of *Inocarpus edulis* – a tree remarkable for its fluted or buttressed trunk and large yellowish fruit. Also *Cananga odorata*, a most handsome tree, with a smooth straight trunk and very handsome foliage, spreading in a distichous manner. *Artocarpus* was also plentiful. Wandered along the old inland road – in many places paved, and bordered with low stone walls⁴.

Wednesday, 24 May. Writing letters all the morning. In the afternoon drove in to Avarua to post our correspondence for the homeward steamer. Got back about 7 pm.



Fig. 7. Black Rock, Rarotonga, 1899. "Took a few photographs of the Black Rocks in the evening" (10 June). Photo: T.F. Cheeseman (Auckland Museum Library).

Thursday, 25 May. Got Matthew Kea, a bright young boy, to go with me and carry my vasculum. We walked half way to Arorangi and then struck inland until we reached the old road of Toi, along which we walked for some distance. Saw a splendid Banyan tree [= *Ficus prolixa*], with its aerial roots all fused into an enormous trunk. Unfortunately it had neither flowers or fruit. Also saw a tree called the "Pukatea" – but it too had no flowers or fruit. It attains a height of over 60 ft, has a smooth pale bark, buttressed at the base, like the New Zealand plant bearing the same name, but the foliage is altogether different. Another tree new to me is the cotton tree, or "Vavai". It has a clean cylindrical trunk with smooth and even bark, studded here and there with formidable short spines inserted on a broad base. In the evening went with Rose and the Rices to take tea with Miss Large, the teacher of the London Missionary Society's large boarding school.

Friday, 26 May. In the morning went with Matthew Kea to Arorangi, and beyond the village to the mouth of the little stream. Then struck inland. Saw *Inocarpus* in great plenty, one tree having a few flowers left. Collected what I suppose to be *Jussiaea suffruticosa*, growing in great plenty round the margins of some artificial swamps used for cultivating the Taro. Collected also *Davallia parallela* (?) growing on the lower portion of the trunks of Cocoa nut palms, *Oxalis*, *Siegesbeckia*, a curious little *Euphorbia*, etc. etc. In the afternoon Matthew brought his father, mother and three brothers to be photographed [Fig. 6]. Afterwards I took a walk to the top of a burnt hill a little distance from Mr Rice's. A second growth of *Casuarina* is rapidly covering the hill; but at present the most conspicuous plants are *Gleichenia dichotoma*, which covers the ground like our *Pteris aquilina* in N.Z., a tall grass not in flower; a purple *Ipomoea* [= *I. littoralis*], and *Paspalum scrobiculatum*. When returning I gathered a *Cyperus* near a swampy hollow occasionally filled with water after heavy rains.

For cultural reasons, this image has been removed.
Please contact Auckland Museum for more information.

Fig. 8. People and horses with cultivations beyond, Rarotonga, 1899. This is probably the Rice's garden at Arorangi. The European man may be Mr Rice, and the European women Mrs Rice and Mrs Cheeseman. Photo: T.F. Cheeseman (Auckland Museum Library).

Saturday, 27 May. Struck inland from Mr Rice's by way of Hill's plantation until I reached the mouth of a large gully which evidently comes quite from the heart of the mountains. Found a considerable number of ferns new to me. *Acrostichum*, 2 species, one of which is evidently *A. spicatum*, *Adiantum hispidulum*, two or three species of *Asplenium*, two *Trichomanes*, etc. Enormous plants of *Marattia fraxinea*⁵ were observed in several places close to the edge of the stream, some of the fronds must have been quite 20 ft long. A curious shrub, probably a *Boehmeria*, was common along the stream. But the find of the day was a *Fitchia*, perhaps the same as the *F. nutans* of Tahiti. It forms a small tree, 10-25 ft with slender trunk. The flowers are solitary and hang downwards. They are of large size, and of a beautiful orange colour. Leaving the edge of the stream, and climbing up the hill side I saw several fine plants. A *Melastoma*, with large white flowers was plentiful. A large *Weinmannia* was also abundant. Great quantities of *Schizaea dichotoma* were growing in the shade of the trees and two epiphytic orchids were gathered; one being quite leafless, with the rhizomes or stems spreading in a stellate manner on the trunk of the tree [this orchid is *Taeniophyllum fasciola*].

Sunday, 28 May. Had an early breakfast and drove to Avarua. Met Dr Craig there by appointment, and as soon as he had disposed of his hospital work we started to make the ascent of Hikurangi [= Ikurangi], a bald peak just to the N.E. of Avarua township. We drove a couple of miles out of the town, and then turned up a side track for half a mile or so until a little hut was reached. Here we left our buggy, and after disposing of our coats and all other unnecessary impedimenta a start was made for the mountains. Our party consisted of Dr Craig and myself, and seven Rarotongans, named respectively Pakari, Karatau, Enea, Ropou, Tere, Makitira,

and Ahpu, the latter Dr Craig's servant. Out of the seven, only two had been engaged to come with us, the remainder joined the party out of curiosity. After leaving the hut, the track followed the bed of a little stream for some distance. Magnificent trees of *Inocarpus edulis* were passed, but the chief vegetation was the Au (*Hibiscus tiliaceus*). Here and there were swampy patches filled with Taro, the edge of the ponds fringed with *Jussiaea suffruticosa*. Further on were great quantities of *Marattia fraxinea*, the native name of which I was told was Anae⁵.

After a time we left the stream, and struck up an open spur, mainly covered with *Gleichenia dichotoma* and a coarse and tall tufted grass not in flower. We passed through large patches of *Melastoma denticulata*, the native name of which is Kotaa. *Lycopodium cernuum* was common. Ascending a little higher, we had light scrub on each side, mainly composed of *Fitchia* (native name Neinei), *Mussaenda frondosa* (native name Kotuku) and an apparently Apocynaceous plant with milky juice, very shiny leaves, and large panicles of small, strongly contorted, white or yellow flowers [= *Alstonia costata*]. The *Weinmannia* noticed in the gullies opposite to Mr Rice's was also very common.

A steep climb brought us on to a higher wooded ridge trending more to the right, and this we followed for a considerable distance. At last we reached the foot of the main peak, and here, at an altitude of about 800 ft, we called a halt. On a steep rocky face to our right I noticed great quantities of a small Rubiaceous plant 6-18 inches high, with small white flowers [= *Hedyotis foetida*]. *Peperomia* also was abundant – also *Metrosideros polymorpha*. Finding it impossible to keep along the ridge, we struck along the eastern face of the peak, ascending it obliquely. Great quantities of *Ascarina* were noticed – also *Fitchia* and *Fagraea*, and a considerable number of trees not yet identified. The very summit of the peak was exceedingly difficult of ascent, and but for the trees growing here and there would have been still more so. Great care had to be exercised by those in front, lest they should accidentally roll stones on those below. Towards the top quantities of *Lycopodium flagellaria* and another species were noticed, also a curious single leaved Orchid with a spike of small greenish flowers⁶. At last the summit was reached, my aneroid making the height to be 1575 ft.

The most abundant tree on the summit was *Fitchia*, in full bloom; dwarfed to a height of 8 or 10 ft. *Metrosideros polymorpha* – *Boehmeria* sp. – *Fagraea Berteriana*, also plentiful – the most abundant plant after the *Fitchia* was a small tree with oblong leaves 1 inch long, and with roundish immature fruit [= *Xylosoma suaveolens* subsp. *gracile*]. Other plants – *Oxalis corniculata*, *Davallia elegans*, *Nephrolepis exaltata*, *Oplismenus*, *Ageratum conyzoides*, *Polypodium phymatodes*, *Peperomia*, *Cordyline terminalis*, *Euphorbia* (same as coast species)⁷, Mountain grass – etc etc.

Our party soon rigged a flagstaff, and a large flag was soon displayed to the gaze of the inhabitants of Avarua. And then to my surprise the whole of our natives knelt down and offered up lengthy prayers as a recognition of their successful ascent. The scene was a very curious one. Seven stalwart dark skinned Polynesians, ranged in a circle on bended knees, with bare heads and serious or even devout aspect, listening attentively while their leader prayed loudly and fervently. He evoked the care of the Almighty for each of the party not forgetting to mention myself, asking that the Tohunga who had come from so far to examine the plants of Rarotonga should be strengthened and supported in all his doings.

After an hour's stay on the summit we descended, taking a more direct route than the one followed in the ascent. It was getting dark when we reached the hut. Here a brief stay was made while a meal of bread & cheese and bananas was made. Then a drive of half an hour's duration took us to Avarua. Here a heavy shower of rain compelled us to wait until nine o'clock, after which Dr Craig drove me out to the Rice's.

For cultural reasons, this image has been removed.
Please contact Auckland Museum for more information.

Fig. 9. Group of young men, Rarotonga, 1899. Photo: T.F. Cheeseman (Auckland Museum Library).

Monday, 29 May. The morning was occupied in arranging my collections, drying my paper, etc. In the afternoon drove in to Avarua, and called on Mr Hutchin, the resident missionary. His place is a very pretty one – the parsonage, a substantial stone building – nestles at the foot of a steep rocky hill. In front is a small and well kept grass field with a neat drive leading to the church, a large and massive stone building. Drove home in the evening.

Tuesday, 30 May. Soon after breakfast started with Mr Rice for the ascent of Maungaroa, the long range the termination of which overlooks the village of Arorangi. We drove to Arorangi, and then some distance past, turning off a little before reaching the little stream which runs into the sea about a mile beyond Arorangi. We followed a rough track until a hut was reached. Here we left the buggy, and crossing some taro patches, round the margin of which *Jussiaea suffruticosa* was growing in great luxuriance, struck along a footpath with abundance of *Inocarpus*, *Vi*, and other trees, we at length reached the old road of Toi. Following this to the eastwards for a short distance, we reached another footpath striking off to the left. Half an hour's walk on this brought us to an abandoned clearing and old house, half smothered in a rank growth of *Leucaena*, *Sida*, etc. Noticed three large and handsome trees of *Cerbera odollam*, covered with abundance of deliciously scented large white flowers: and also with large pendant fruits – oblong, and 3-4 inches long. Leaving the cultivation, a short walk through a patch of light bush brought us to the foot of a steep open slope leading up to Maungaroa itself. This was scattered over with huge rocks of all sizes and shapes, covered over with a vegetation mainly composed of *Gleichenia dichotoma*, *Lycopodium cernuum*, a tall stout grass 4-7 ft high, and a few other plants. Here and there were plants of *Mussaenda frondosa*, with their panicles of yellow flowers, and white foliaceous calyx lobes. Further on large areas were covered with *Entada scandens*, with its tough rope like stems and

erect spikes of small greenish flowers. I did not notice pods. A little distance up the spur were a few fern trees – a species of *Alsophila*. The Caudex was about from 4 to 6 ft high, and barely thicker than a man's wrist. A little higher up a single specimen of a *Cyathea* was observed – with a stout trunk thicker than a man's thigh. A steep climb brought us up to the summit of the range – the lower part of Maungaroa. This part forms a flat topped hill [= Raemaru] the highest part of which was 1225 ft high. It has a steep escarpment towards the west and south, but slopes away more gradually towards the east, the side on which we ascended it. Vegetation principally stunted *Gleichenia dichotoma*, *Lycopodium cernuum*, a sedge (perhaps a *Fimbristylis*) a curious herbaceous plant with much of the habit of an *Euphorbia*, but altogether different. Here and there were patches of a small Scrophulariaceous plant [= *Lindernia crustacea*] with flowers much like an *Euphrasia*. A minute *Ophioglossum* [= *O. nudicaule*] was also plentiful. We struck along the ridge towards the higher portion of the range, first descending a little from the flat-topped hill. The ridge soon became very narrow, and covered with forest, principally composed of *Metrosideros*, *Fitchia*, *Fagraea*, with an undergrowth of *Freycinetia* and ferns. Collected specimens of what appears to be *Canthium barbatum*, also a species of *Psychotria*⁸, and a plant much like a *Geniostoma*. Finding it impossible to reach the top of the range that day we retraced our steps to the clearing and then to our horse and buggy, reaching home a little time before dark.

Wednesday, 31 May. In the morning dried my paper and changed my plants. In the afternoon walked on the beach to Arorangi. Collected a nettle like plant in one of the Maori cultivations which I take to be a species of *Fleurya*. The Pukatea appears to be common along the beach, mixed with the Utu (*Barringtonia*) and Puka (*Hernandia*).

Thursday, 1 June. Rainy and threatening in the morning. In the afternoon walked to the Black Rocks, about a mile from Mr Rice's. Obtained *Leucaena Forsteri* in flower, also



Fig. 10. Ziona Cook Islands Christian Church (built c. 1849), Arorangi, Rarotonga, 1899. Photo: T.F. Cheeseman (Auckland Museum Library).

Eclipta alba, a sedge new to me, and *Ipomoea biloba* [= *I. pes-caprae* subsp. *brasiliensis*], which creeps for yards over the surface of the rocks. So far this place is the only part of the island where I have noticed the Volcanic rocks coming down to sea level. Striking inland, I noticed some fine trees of Cacao (*Theobroma*) and an unusually fine grove of *Inocarpus*. A little further on I came across the finest Banyan (*Ficus prolixa*) I have yet seen.

Friday, 2 June. Started with a Maori boy for the ascent of the culminating point of the Maungaroa Range. We walked from Mr Rice's to Hill's plantation. Here we found another Maori boy carrying a cock, with a long string tied to its leg. I found by enquiry that the boys are in the habit of carrying these cocks into the hills. They put them down in an open place near to where they believe there are numbers of wild fowl. The cock commences to crow, attracting the wild cocks, who come and commence to fight with the tame one. They get entangled with the string, when the boy rushes up and catches the wild bird. Our road led up the bed of the creek which I had visited on May 27th. We followed the stream until we reached the foot of a bare spur leading from the Maungaroa range. Crossing from this spur to another one, and then to a third still further up the valley, we commenced the ascent. The sides of the spur had plenty of *Blechnum orientale*, with *Gleichenia* on the face and top. The gullies on the right and left were filled with *Weinmannia*, *Fagraea*, *Fitchia*, *Matoa* [probably *moto* = *Homalium acuminatum*], etc etc. The bare ridge led up well on to the face of the mountain, but was steep and rocky towards the top. Collected a *Nephrodium* here, also a small green *Cyperus*.

Entering the forest, we found that our road led on the top of a narrow ridge. A species of *Coprosma*, reminding me to some extent of the Kermadec Islands *C. acutifolia*, was plentiful, and I obtained both ♂ and ♀ flowers. Then I observed plants of *Wikstroemia* – a handsome shrub, of a peculiar green tint resembling some honeysuckles. Its flowers were greenish yellow. The principal vegetation on the ridge was *Metrosideros*, *Fagraea*, *Fitchia*, *Coprosma* and one or two others. And this continued all the way up to the highest peak, which I made out to be 1650 ft. The undergrowth is principally composed of *Freycinetia*, *Blechnum orientale*, and other ferns. Towards the top were great quantities of a terrestrial orchid, with a single leaf and a spike of greenish flowers⁶. *Oberonia* was also plentiful and two epiphytic species. A species of *Lomaria* and a *Doodia* were not uncommon towards the top. On the sharp ridges I collected a shrubby plant 2-3 ft high which may be *Vaccinium*, also a Rosaceous plant with creeping stems and pinnate leaves, which seems to me to be near the Sandwich Islands *Osteomeles*. The same plant was observed much lower down on our return. After a brief stay on the top we retraced our steps, keeping much lower down the main ridge before turning off. A handsome large leaved shrub with axillary panicles of whitish flowers and fleshy fruit was also collected. Also a *Loranthus*, growing parasitically on *Fitchia*. We reached Mr Rice's at dusk, well satisfied with our journey.

Saturday, 3 June. In the morning arranging plants and drying paper. In the afternoon drove to Arorangi, and bought a number of bowls, drums, stone beaters and other curios for the Museum⁹. Rain set in a little before 5, driving us home.

Sunday, 4 June. Heavy showers, with thunder and lightning, during nearly the whole of the night. Some remarkably heavy showers about breakfast and from thence onwards until about 2 o'clock, when the rain ceased. Too wet to do anything for the rest of the day.

Monday, 5 June. Changed my plants in the morning, which was somewhat drizzly. About dinner the sun came out, and I was able to dry my paper – which I could not do for the two previous days. Rain set in again in the evening; no collecting possible.

Tuesday, 6 June. In the morning changed my plants, and dried paper etc. In the afternoon drove through Arorangi towards Titikaveka. Collected *Canavalia sericea*, a *Vitex* like shrub

with trifoliate leaves and blueish flowers, and a sunflower like plant [= *Tithonia diversifolia*]. Heavy showers prevented us from going off the road. In the evening called in at Arorangi, and bought some more pounders, etc.

Wednesday, 7 June. In the morning until 11 changing plants, etc. Then went out and examined the gullies and spurs coming from the lower part of the Maungaroa Range. Collected a few additional plants.

Thursday, 8 June. Changing plants and drying paper in the morning. In the afternoon went up one of the spurs of Maungaroa. Got several interesting plants new to me.

Friday, 9 June. Mr Rice drove me round the island¹⁰. After passing the stream which runs into the sea a little distance beyond Arorangi, the iron-wood belt which generally fringes the sea ceased – although there was still plenty on some of the rocky hills inland. Some nice bushes of *Pandanus* lined the beach near Papua, of which I secured some photographs. Saw one or two trees of *Calophyllum inophyllum*. The beach was covered in many places with *Ipomoea biloba* [= *I. pes-caprae* subsp. *brasiliensis*] and *Canavalia sericea*. Further on, at Titikaveka, giant Pukateas lined the shore. The old ones are generally buttressed at the base and frequently hollow – often with cavities big enough to admit a man. At Ngatangia [= Ngatangiaia] the reef has several little islands on it, thickly covered with vegetation, forming quite a sheltered little harbour. Found several saline plants here, not previously seen on the island. At the entrance to the harbour it is possible to walk right down to the edge of the reef. Here I collected a grass new to me, a *Portulaca*, and a fleshy shrubby plant with large fruit [probably *Capparis cordifolia*]. The whole neighbourhood is well worth a careful exploration. From Ngatangia we drove to Matavera, and from thence to Avárua and home. The lowland vegetation is practically the same all round the island.



Fig. 11. Dwellings, Rarotonga, 1899. Note four-wheeled buggy under lean-to. Photo: T.F. Cheeseman (Auckland Museum Library).

Saturday, 10 June. At home all day, drying paper and changing plants. Took a few photographs of the Black Rocks in the evening [Fig. 7]. Heavy rain, with unusually vivid lightning, set in after dark.

Sunday, 11 June. Heavy rain before daylight. After an early breakfast drove in to Avarua by appointment with Dr Craig, to make the ascent of the flat-topped mountain between Avarua and Ngatangia. But the rain had been too heavy, and after a consultation it was decided to defer the expedition until the following day. Saw Col. Gudgeon for the first time. Drove home, and spent the rest of the day studying and arranging plants.

Monday, 12 June. Attending to plants in morning. Then walked to Nichola's clearing beyond the "Black Rocks". Was much impressed with a Fungus (Tremelloid?) which entirely covered the sides of the track to the clearing. It was most slippery to walk over, and in places was more than 2 or 3 inches deep. Saw a fine large Cacao tree in full fruit, but little else of importance. In the afternoon heavy showers, which kept me at home.

Tuesday, 13 June. In the morning attending to plants and photographing. In the afternoon drove in to Avarua to call upon Col. Gudgeon. Drove home in the evening, and narrowly escaped being caught by the rain. The Ovalau passed Mr Rice's about 9 o'clock.

Wednesday, 14 June. Much cooler weather, with a strong S.W. breeze. Drove in to Avarua to get my letters in the morning, and collected weeds, etc, about the township. In the evening arranging plants, etc.

Thursday, 15 June. Drove to Papua, accompanied with a Maori boy called Josephus. Ascended the stream as far as a waterfall about 30 ft in height. In the valley below the fall, which was densely wooded, saw *Hernandia Moerenhoutiana* for the first time. This is in some respects handsomer in foliage than *H. peltata*. Also collected great quantities of *Nephrolepis altescandens*, climbing up trees to a considerable height. Above the falls *Trichomanes rigidum* was very plentiful. Struck up a spur in the direction of a tall pillar of bare rock [Te Rua Manga, "The Needle"] which shows very distinctly from the sea. At first the spur was open, but at length the bush was reached. Collected a possibly Euphorbiaceous plant, a small tree or shrub with milky juice and oblong berries $\frac{3}{4}$ inch long, quite black when ripe [= *Alyxia stellata*]. Also saw *Viscum articulatum* parasitic on *Fitchia*.

Friday, 16 June. Drove in to Avarua. Had lunch with Dr Craig, and then walked with him up the track behind the township. Collected a large *Asplenium* of the *Diplazium* section, also *Pteris comans*, *Phaseolus adenanthus*, and one or two others.

Saturday, 17 June. Weather unfavourable. Working in doors attending to plants etc.

Sunday, 18 June. Had an early breakfast and then drove in to Avarua, leaving our horse and buggy at the back of the Post Office. Started with Ahpu and two other Maoris to ascend the flat-topped mountain [Te Kou] at the head of the [Takuvaie] valley. Great quantities of Taro plantations in the valley, irrigated by little streams drawn from the gully. Fehi [= *Musa troglodytarum*, a kind of banana] very plentiful indeed, and evidently much resorted to by the Maoris. Towards the head of the valley observed a handsome large *Polypodium* with fine bold pinnae, the sori showing as elevated pustules on the upper surface – also *P. nigrescens* and *Nephrodium decompositum*¹¹. Found the ascent of the mountain very steep, and we had much difficulty in finding a practicable path. The summit proved to be 1850 ft, or 200 ft higher than Maungaroa. The principal vegetation on the top is *Weinmannia*, *Metrosideros* – apparently 2 species [actually one species existing in two forms or phases] – *Ascarina*, *Fitchia* etc with undergrowth of *Freycinetia* and a curious Bamboo like grass [= *Isachne distichophylla*]. *Lomaria procera* very plentiful and large size. *Acrostichum* [spelling uncertain but most likely this] *conforme*, a curious *Hypolepis* looking fern, *Trichomanes digitatum*, and *Polypodium Hookeri* were gathered for the first time. A species of *Carumbium* was noticed, closely

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Fig. 12. Unidentified persons, Rarotonga, 1899. Photo: T.F. Cheeseman (Auckland Museum Library).

resembling our N.Z. plant, also a curious looking *Pisonia* like plant [probably *Pisonia umbellifera*]. Mosses were very plentiful on the top.

Monday, 19 June. Weather unfavourable. Kept in doors, but had plenty to do attending to my collections.

Tuesday, 20 June. Drove to Ngatangiia. Collected a number of marine shells on the reef at the back of the village, and took some photographs of the harbour. Collected *Tournefortia* for the first time, also a creeping water plant which may be *Jussiaea repens*.

Wednesday, 21 June. Attending to plants part of day, writing letters for mail rest.

Thursday, 22 June. Stormy and disagreeable. Working indoors.

Friday, 23 June. Fine. Went with Josephus up the hill to the north of Maungaroa. Saw plenty of *Fitchia* and most of the other plants noticed on Maungaroa. Collected *Andropogon refractus* and another grass new to me, also a fresh orchid, looking much like a *Sarcochilus*. On the way back Josephus shot two specimens of the loi bird¹².

Saturday, 24 June. In the afternoon climbed up the hill at the back of the Tereora school. Collected *Andropogon refractus* and a *Chloris* new to me. Saw *Dodonaea* for the first time in N.Z. [error for Rarotonga]. A fine large leaved tree probably allied to *Calophyllum* [possibly *Terminalia glabrata*] was also collected, and a tree with alternate 3-veined leaves. It has milky juice, and may be Euphorbiaceous [this species is *Pouteria grayana* (Sapotaceae)].

Sunday, 25 June. Drove to Avarua, and got three Maori boys to go up Maungatea with me. The track follows a ravine on the N.E. side of the mountain. Height of the mountain 1650 ft. For bearings of other peaks see note-book. A lower portion of the hill is bare and flat topped [Maungatea Bluff], covered with stunted *Gleichenia*. On the higher wooded peaks the principal trees, etc, were *Weinmannia*, *Ascarina*, *Rata*, *Freycinetia*, *Neinei*, *Pua*, *Karaka*,

Melastoma, *Davallia solida*, *Trichomanes radicans*¹³, *Oberonia*, Large leaved orchid, *Coprosma*, *Lepinia* etc, *Wikstroemia*. The principal trees were certainly *Weinmannia*, *Rata*, *Neinei*.

Monday, 26 June. Rain most of day. Kept indoors, and could not even dry my paper.

Tuesday, 27 June. Showery in early morn but cleared up and I was able to dry my paper and change my plants.

Wednesday, 28 June. A fine day at last. At nine o'clock started with Tanei and Josephus for the gully on the S. side of Mangaroa [= Maungaroa]. We drove through Arorangi as far as the stream flowing into the sea a little beyond the village and then struck inland to Mr Gelling's plantation. Leaving it, we passed through a patch of forest, where I obtained my first specimens of *Ophioglossum pendulum*. Many of the fronds were 5-6 ft in length, by about 1½ inch wide, strongly undulated at the edge. Passing on we emerged from the bush and crossed the bare south east slope of Maungaroa, the principal vegetation on which was *Gleichenia* and *Lycopodium cernuum*. We then struck into the gully. This we found to be covered mainly with *Hibiscus tiliaceus*, growing very closely intertwined. Here and there were large patches of the Fehi. The whole gully had evidently been cultivated at one time, for the stone foundations of the houses, the cooking places, etc, could still be easily seen. Going still further, I succeeded in finding a clump of *Cyathea*, to obtain which I had made the expedition. *Alsophila decurrens* was growing with it, together with the ubiquitous *Marattia*. Little else of particular note was seen. Open places on the sides of the gully were filled with *Pteris incisa*, growing to a great size. On our return we took the old inland road at the back of Arorangi. I observed several plants of *Solanum repandum*, the fruit of which my Maori boys ate with avidity¹⁴.

Thursday 29 June. Drove to Avatiu, and then walked up the creek. Large orange plantations occupied the major part of the lower portion of the valley, alternating with Taro swamps. Higher up there was the usual vegetation of *Hibiscus tiliaceus*, *Inocarpus*, *Aleurites* etc. Here and there were open patches or clearings, mostly occupied with Guinea grass. After walking rather more than a mile the track came to an end, and after trying to force my way through the tangle of *Hibiscus* along the stream with very indifferent success, I at length abandoned the attempt.

Friday, 30 June. At home all day, drying paper and sorting my collections. Fine and bright, with a drying wind.

Saturday, 1 July. Drove to Ngatangia. Left horse and carriage at the Chief Pa-te-Pou, and then with a native guide followed up the course of the stream [the Avana Stream] which flows into the head of Ngatangia harbour. A good track ran along the creek of a considerable distance, crossing repeatedly from side to side. As there was a considerable volume of water in the creek this necessitated much wading and jumping from stone to stone. Lower part of valley with the usual vegetation of Utu, Maupe, Karaka, Koka, Puka, Cocoa-nuts, etc. Large taro plantations were passed, very neatly made. A little flat is selected by the side of the stream. This is levelled, and then squares ranging from 20 to 40 ft or more are dug out, and the sides walled with stone to prevent them from falling in. The squares are, of course, gradually higher and higher as the valley is ascended. A flume or ditch is cut from the stream at some convenient point, and a quantity of water turned by means of it into the squares, which are thus kept perfectly irrigated. Some of the older squares, not now used, were very elaborate structures, and must have cost much time to construct and keep in order.

Higher up the *Neinei*, *Weinmannia*, *Kawakawa*, *Turina* and other mountain trees appeared. Ferns became much more numerous. *Asplenium horridum* was particularly

plentiful, also the large thin *Polypodium*. *Monogramme* was gathered for the first time, also a fine new *Trichomanes*, not yet identified.

Sunday, 2 July. At home all morning, drying my specimens and paper. In the afternoon taking photographs, etc.

Monday, 3 July. Drove to Ngatangiia with Rose and Miss Gudgeon. Hired a boat and went over to the island (Motutapu) to the seaward side of Ngatangiia Harbour. Got no plants of importance, but collected some good shells on the beach and took a number of photographs. [Narrative ends abruptly.]

NOTES ON THE TRANSCRIPT

- ¹ The Union Steam Ship Company's two-masted, schooner-rigged S.S. *Ovalau* was built at Dumbarton, Scotland, in 1891 and was destroyed by fire at Lord Howe Island in 1903 (Brewer 1982).
- ² Lieutenant-Colonel W.E. Gudgeon, second British Resident and (after 11 June 1901) first Resident Commissioner of the Cook Islands (Douglas & Douglas 1994).
- ³ The Rev. J.J.K. Hutchin of the London Missionary Society (Anonymous 1907).
- ⁴ Rarotonga has two circular coast roads, the outer, modern Ara Tapu, and the inner, ancient Ara Metua. Cheeseman refers to the latter in subsequent entries as the old road of Toi.
- ⁵ Cheeseman confused two ferns in the family Marattiaceae. *Marattia salicina* (*M. fraxinea* in the diary), also known as para, is the smaller of the two, less common, and grows only at higher altitudes. Anae, abundant in the valley bottoms where Cheeseman was describing the flora on this occasion, is *Angiopteris evecta*.
- ⁶ This orchid is almost certainly *Liparis clypeolum* which does not seem to have been collected or reported since Cheeseman's visit.
- ⁷ This is *Euphorbia atoto*. It is abundant on the *makatea* (raised coral) of some of the other Cook Islands but on Rarotonga today grows only on drier volcanic ridges such as around Ikurangi where Cheeseman went on this day. It is now absent from the lowlands where Cheeseman stated that it grew.
- ⁸ Probably not *Psychotria*, but perhaps the species that Cheeseman later described as *Ixora bracteata*.
- ⁹ "During a visit to Rarotonga, the Curator collected a series of 132 articles, illustrating the ethnology of that island ..." (Anonymous 1900). Much of this material survives in the Auckland Museum ethnology collection (Dr R. Neich, pers. comm.; Fig. 13) including slings and sling-stones, stone axes, stone pounders, mallets, drums, net-making implements, fish-hooks, wooden seats, woven bags, bowls, spoons, masks, shoes and items of clothing.
- ¹⁰ "An excellent carriage-road runs parallel to the shore; and a drive round the island ... can easily be accomplished in four or five hours ..." (Cheeseman 1903).
- ¹¹ The "*Polypodium*" is likely to be *Tectaria decurrens*. "*Polypodium nigrescens*", now *Phymatosorus nigrescens*, is absent from Rarotonga – Cheeseman may have meant *Ph. commutatus*.
- ¹² Rarotonga Starling *Aplonis cinerascens* (Sturnidae). In the Auckland Museum collection there are preserved whole in alcohol four specimens of this species attributed to Cheeseman (B3716–9; see Gill 1996).
- ¹³ *T. radicans* is a Northern Hemisphere species. Which large filmy fern Cheeseman saw is now uncertain.

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Fig. 13. Food pounder (*penu*) shaped in coral rock (Auckland Museum 12285). Collected by Cheeseman on Rarotonga, 1899. Photo: K. Pfeiffer.

- ¹⁴ This species has not been collected on Rarotonga since 1899 and now appears to be extinct there. Today it is extremely rare on Mangaia, and is rare or extinct on many other Polynesian islands. Its natural range is uncertain but it may be conspecific with a species of the high northern Andes. The Polynesians may have introduced it to Rarotonga for its edible fruits.

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APPENDIX 1. Partial list of plant names in the Cheeseman diary showing equivalent names. For Cook Islands Maori names the scientific name is given in the second column. Where Cheeseman used a generic name alone, the species is shown here where this is clear. The current equivalent, in the Rarotongan context, is given for names that are now disused (the modern names may or may not be taxonomically equal). Further equivalent names are given in the text. Names that remain unchanged since Cheeseman's time (e.g. *Carica papaya*) are not listed.

Name used by Cheeseman	Equivalent name
<i>Acalypha</i>	<i>A. wilkesiana</i>
<i>Acrostichum conforme</i>	<i>Elaphoglossum gorgoneum</i>
<i>Acrostichum spicatum</i>	<i>Belvisia mucronata</i>
<i>Ageratum</i>	<i>A. conyzoides</i>
<i>Aleurites</i>	<i>A. moluccana</i>
<i>Alsophila</i>	<i>A. decurrens</i>
<i>Andropogon refractus</i>	<i>Cymbopogon refractus</i>
<i>Artocarpus</i>	<i>A. altilis</i>
<i>Ascarina</i>	<i>A. diffusa</i>
<i>Asplenium</i> of <i>Diplazium</i> section	<i>Diplazium harpeodes</i>
<i>Barringtonia speciosa</i>	<i>B. asiatica</i>
<i>Boehmeria</i>	<i>Leucosyke corymbulosa</i>
<i>Carumbium</i>	<i>Homalanthus nutans</i> aggr.
<i>Chloris</i>	<i>Enteropogon unispiceus</i>
<i>Coprosma acutifolia</i>	<i>C. laevigata</i>
<i>Cordyline terminalis</i>	<i>C. fruticosa</i>
cotton tree	<i>Ceiba pentandra</i>
<i>Cyathea</i>	<i>C. parksiae</i>
<i>Cyperus</i>	probably <i>C. cyperinus</i>
<i>Davallia parallela</i>	<i>Humata banksii</i>
<i>Davallia elegans</i>	<i>D. epiphylla</i>
<i>Digitaria</i>	<i>D. ciliaris</i> or <i>D. setigera</i>
<i>Dodonaea</i>	<i>D. viscosa</i>
<i>Doodia</i>	<i>D. media</i>
<i>Eclipta alba</i>	<i>E. prostrata</i>
<i>Entada scandens</i>	<i>E. phaseoloides</i>
<i>Euphrasia</i>	<i>Lindernia crustacea</i>
<i>Fagraea</i>	<i>F. berteriana</i>
fehi	<i>Musa troglodytarum</i>
<i>Fimbristylis</i>	<i>F. dichotoma</i>
<i>Fitchia</i>	<i>F. speciosa</i>
<i>Fleurya</i>	<i>Laportea interrupta</i>
<i>Freycinetia</i>	<i>F. arborea</i>
gardenia	<i>Gardenia taitensis</i>
<i>Geniostoma</i>	<i>G. rarotongense</i>
<i>Gleichenia</i>	<i>Dicranopteris linearis</i>
<i>Gleichenia dichotoma</i>	<i>Dicranopteris linearis</i>
guinea grass	<i>Panicum maximum</i>
<i>Hernandia peltata</i>	<i>H. nymphaeifolia</i>
<i>Hypolepis</i>	uncertain
<i>Inocarpus edulis</i>	<i>I. fagifer</i>

Inocarpus
 iron-wood
Jussiaea repens
Jussiaea suffruticosa
 karaka
 kawakawa [= kavakava]
 koka
Lepinia
Leucaena Forsteri
Lomaria procera
Loranthus
Lycopodium flagellaria
Macaranga
Marattia fraxinea
 maupe
Metrosideros polymorpha
Monogramme
Mussaenda frondosa
 neinei
Nephrodium decompositum
Nephrolepis exaltata
Nephrolepis altescandens
Oberonia
Oplismenus
Osteomeles
Oxalis
Pandanus odoratissimus
Paspalum scrobiculatum
Peperomia
Phaseolus adenanthus
Pipturus
Polypodium phymatodes
Polypodium Hookeri
Portulaca
Pteris aquilina
Pteris incisa
 pua
 puka
 pukatea
 rata
Sarcochilus
Scaevola Koenigii
Sida
Siegesbeckia
Theobroma
Tournefortia
Trichomanes rigidum
Trichomanes digitatum
 turina
Urena
Vaccinium
 vavai

I. fagifer
Casuarina equisetifolia
Ludwigia peploides
Ludwigia octovalvis
Elaeocarpus tonganus
Pittosporum rarotongense
Bischofia javanica
Alstonia costata
Schleinitzia insularum
Blechnum procerum aggr.
Decaisnina forsteriana
 probably *L. squarrosus*
M. harveyana
Angiopteris evecta
Inocarpus fagifer
M. collina
Vaginularia angustissima
M. raiaateensis
Fitchia speciosa
Lastreopsis pacifica
N. hirsutula
Arthropteris palisotii
O. equitans
O. compositus or *O. hirtellus*
O. anthyllidifolia
O. corniculata
P. tectorius
P. orbiculare
 species uncertain
Vigna adenantha
P. argenteus
Phymatosorus grossus
Grammitis cheesemani
P. lutea
Pteridium esculentum
Histiopteris incisa
Fagraea berteriana
Hernandia nymphaeifolia
Pisonia grandis
Metrosideros collina
Trachoma papuanum
S. taccada
S. acuta or *S. rhombifolia*
Sigesbeckia orientalis
Th. cacao
T. argentea
T. dentatum
T. taeniatum
Hernandia moerenhoutiana
U. lobata
V. cereum
Ceiba pentandra

vi

Viscum articulatum

Vitex

Weinmannia

Wikstroemia

Spondias dulcis

Korthalsella platycaula

V. trifolia

W. samoensis

W. foetida

CARVED ENTRANCES OF MAORI SEMI-SUBTERRANEAN STOREHOUSES

ROGER NEICH

Abstract. Using four early nineteenth century field illustrations of rua tahuhu semi-subterranean storehouses with carved entrances from the Whanganui district, this study assembles new information on their architecture and artistic embellishment. On this basis, thirteen carvings in museum collections in New Zealand and Europe are identified as the entrances of this type of rua tahuhu. This corrects previous interpretations of these carvings as the entrances of raised pataka storehouses. Analysis of the localities of origin and the tribal associations of these carvings enables the new definition of a Whanganui/Taranaki regional type of rua tahuhu entrance which spans the major stylistic divide between western sinuous and eastern 'square' figure carvings. The stylistic relationships of these rua tahuhu carvings clarifies the range of tribal carving styles among Taranaki, Ngati Haua, Ngati Ruanui, Nga Rauru, Whanganui and Ngati Apa tribes. Symbolically, these carvings probably represent a local tribal ancestor rather than a more remote deified creator-ancestor. In contrast to this Whanganui/Taranaki regional type, three other different regional types of rua tahuhu entrance are now defined, namely an East Coast, an Eastern Bay of Plenty, and a North Auckland type.

In the general literature on Maori art and architecture, scarcely any attention has been paid to the carved doors and doorways of semi-subterranean storehouses. Of the earlier writers, only Best (1916:74, 76, 78) has assembled references which mention the rare occurrence of notched patterns on the maihi, a little carving on the lintel of the doorway, and a carved door. Later, mainly archaeological, writers on semi-subterranean storehouses have made very little use of Best's wider material on these constructions, and none have followed up on the question of carved or decorated entrances.

When Fox (1974; 1976:39-43) surveyed the evidence concerning prehistoric Maori storage pits, their doors and doorways were described only in terms of the remaining archaeological evidence in the form of earth buttresses, with no discussion of any possible timber constructions. Most recently, Davidson (1984:121-127) did not discuss the entrances of rectangular storage pits. This contrasts with the extensive and detailed discussion devoted by many writers to the doorway carvings of meeting houses and raised pataka storehouses.

This study seeks to redress this neglect by clarifying the status of semi-subterranean storehouse carved doors and doorways as a distinct category of artefact and architectural element. All the evidence of their form and architectural function to be gleaned from early illustrations is presented, all the known examples of such doors and doorways now held in museums are assembled and described, their stylistic and regional distribution is examined, and their possible symbolism explored. These doors and doorways are shown to constitute an important architectural and artistic component within the known range of Maori material culture. Their identification also adds considerably to the corpus of well-documented carvings required for the better detailed definition of regional and tribal carving styles, especially needed in the south Taranaki-Whanganui region.

When these types of carvings have been mentioned in the recent literature, most notably by Day (1982; 1983:137) and Simmons (1985:34-35, 89, 93, 96, 103), they have been

interpreted as either the door or the figure above the doorway of a raised pataka storehouse. In the course of a wider survey, this study re-examines the work of Day and Simmons on this subject and argues that virtually all of the carvings of this type described by them as pataka carvings are actually entrance carvings of semi-subterranean storehouses.

SEMI-SUBTERRANEAN STOREHOUSES

As a distinct type of architectural construction, semi-subterranean foodstores are to be distinguished on the one hand from elevated storehouses known as pataka and whata raised on piles or high posts, and on the other hand from completely subterranean stores known as rua, cut either horizontally or vertically into the ground. Pataka and whata (where the latter term is applied to an elevated house rather than a simple platform) often display varying amounts of carving on their outer timbers, whereas rua entrances were generally left plain except for some rare examples.

The type of semi-subterranean stores which concern us here share some features of both pataka and rua, with some external carved embellishment but excavated partly into the ground, either on level ground or backed into a steep slope or bank. The floor level was excavated lower than the surrounding ground, the gabled front with the single central entrance was constructed out of shaped timbers, and a horizontal ridgepole supported the roof which sometimes abutted on to the sloping ground of the rear in the case of those built against a bank. Fox (1974) has described the various arrangements of posts supporting the ridgepole, ranging from a single row of posts to three or more postrows in a single pit-store. The main function of these semi-subterranean storehouses was the storage of kumara (Best 1925:118-9).

Elsdon Best (in Phillipps 1952:96-9) has recorded the following Maori terms of relevance to this type of semi-subterranean store:

- kopani - door or board closing entrance to a pit, store
- patengitengi (patengi) - storehouse for kumara or pit
- perepere - slab over door of a rua kai, inside jambs
- rua kai - food store pit
- rua kumara - kumara store pit
- rua koauau - kumara store pit
- rua pare - a storehouse made in the ground
- rua tahuhu - a roofed pit semi-subterranean store
- rua tatara - semi-subterranean pit store having rat-stopping appliance
- rua tuanui - synonymous with rua tahuhu
- rua tiriwa - store with an excavated floor

Judging from these terms, the type of store to be discussed in this study would probably be called a rua kumara and more specifically a rua tahuhu or a rua tuanui, where tahuhu and tuanui refer to a ridgepole and roof. However, it should be noted that Best (1916:95) maintains that the name rua tahuhu was applied only to large pit stores owned in common by several families, whereas smaller rua made for the use of one family were not called rua tahuhu. On the evidence to be presented here it is not possible to determine whether the storehouses involved were intended to serve one family or several. The possibility of regional differences in terminology must also be conceded.

The actual carved entrance element could then be called a kopani if it is the door closing the entrance, or a perepere if it functions as a slab above the actual doorway entrance. As will

be seen below, both kopani and perepere are relevant depending on the finer details of the specific function of each of these carvings.

In an extensive description of the construction of a rua tahuhu, Tuta Nihoniho of Ngati Porou (in Best 1916:93-5) used the term “perepere” for a board or plank with notched edge for ventilation against which the top of the door rested. Nihoniho stated that the perepere was sometimes carved with a kowhaiwhai pattern and extended right up to the ridgepole which it touched. He explained that the door, for which he does not give a Maori term, was composed of one or two planks sewn together. As a detached slab, this door was inserted into a groove at the bottom of the doorway and jammed in against the perepere at the top, being held in place by pegs. Nihoniho was describing an East Coast form of rua tahuhu in which the doorway construction apparently differed from the predominantly Whanganui/Taranaki form with the type of carved entrance to be described in this study. Nevertheless, his usage of the term “perepere” is helpful.

In a Ngati Ruanui/Taranaki “lament for a plantation” (Ngata and Hurinui 1970:177), the parts of a kumara store pit are personified thus; “the supporting pillar (pou), the stepping-over beam (paepae), the lid or trapdoor (kopani) and the cleared floor-space (papa-ahu)”. This gives some confidence that the term “kopani” is authentic usage for the door of roofed rectangular semi-subterranean storehouses and therefore perhaps for the door version of the type of carvings described here, at least in the Taranaki/Aotea canoe area. Williams’s Maori dictionary gives “kopani” as a door or lid specifically fitting into an opening but not sliding or turning on hinges. Such a sliding or turning door would be called a “tatau”.

Because of some doubts concerning regional terminological differences and differences in constructional details, the evidence for the exact applicability of the terms “perepere” and “kopani” to the carvings described here is not conclusive. However, no other terms are known and these at least are very specific to rua tahuhu (as opposed to “kuwaha” which is used very generally), and have some degree of authenticity. Therefore they will be used in this study with the above proviso. Hopefully, this study might elicit authentic Whanganui and Taranaki regional terminology for these structures.

EARLY ILLUSTRATIONS OF CARVED RUA TAHUHU ENTRANCES

Fortunately, four early nineteenth century illustrations have been located showing various rua tahuhu with carved entrances in place. These illustrations provide the only available detailed evidence on how these carved elements fit into the total construction of the rua tahuhu. Ranging in date from the 1840s to the 1860s, these illustrations show a marked development of neatness in construction, perhaps reflecting the use of stone tools in the manufacture of the 1840s storehouse being replaced by metal tools and pit-sawn timber by the 1860s. The localities of these illustrations also provide additional evidence for the geographical distribution of this type of storehouse entrance. Each item is listed alphabetically to enable plotting on a distribution map (Fig. 1).

A. Rua tahuhu at Putiki-wharanui Pa, Whanganui, 1841-1847

Fig. 2

This semi-subterranean storehouse was first drawn in pencil as part of a village scene entitled “Scraps from Putiki warre nui” by the Scottish artist John Alexander Gilfillan at some time between 1841 when he arrived in New Zealand and 1847 when he left for Australia. A wash version of this sketch by Gilfillan, dated 1840, was published by T.W. Downes in his

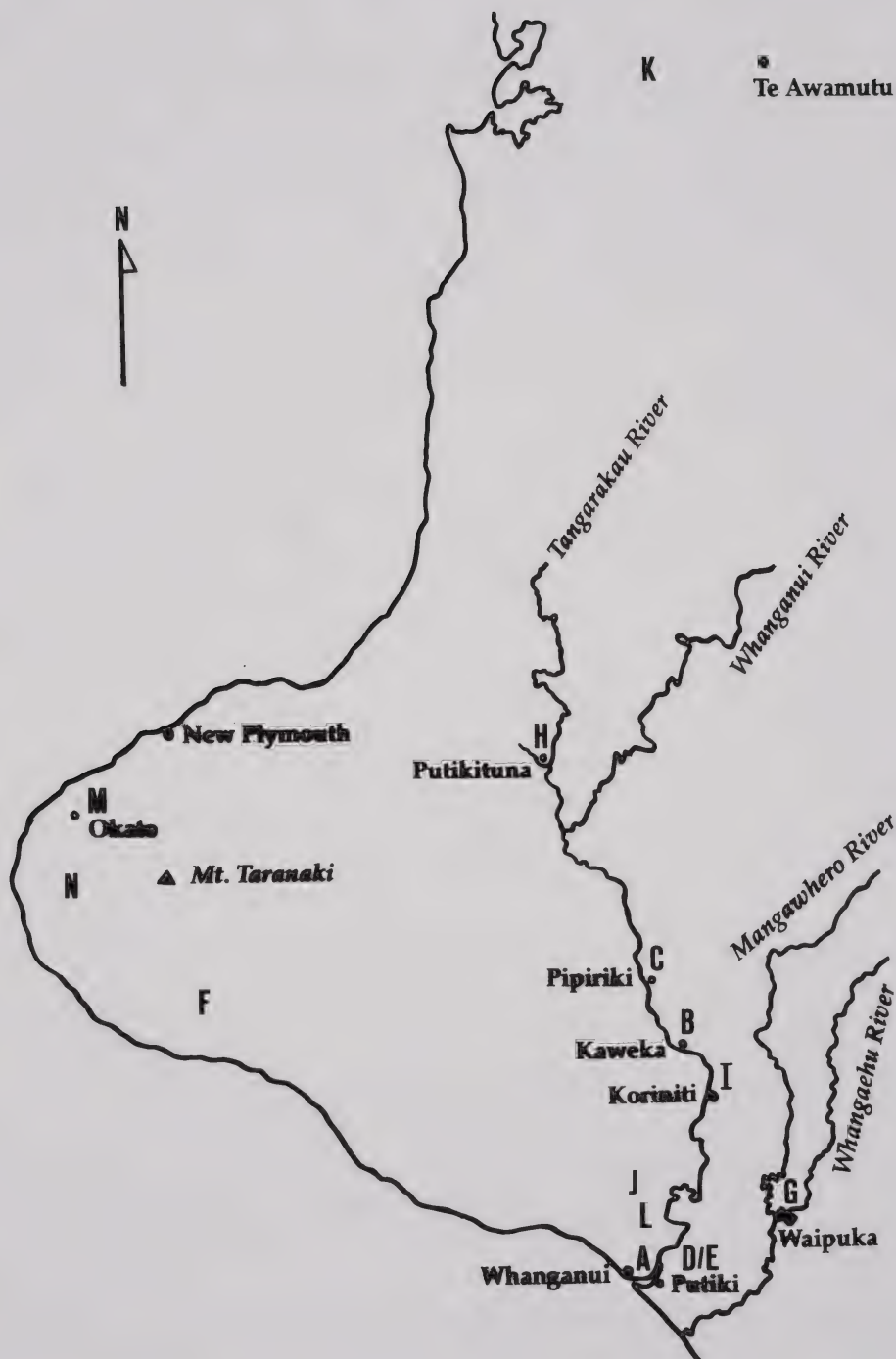


Fig. 1. Map of western areas of the North Island of New Zealand showing localities of rua tahuu carved entrances described in the text, referenced alphabetically.

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Fig. 2. Rua tahuhu (A) at Putiki-Wharanui Pa, Whanganui, 1841-1847. Sketch by J.A. Gilfillan.
Photo: Hocken Library, Dunedin G473.

book *Old Whanganui* (1915:8). The same semi-subterranean store appears again in a watercolour composite village scene, said to represent Putiki, painted later by Gilfillan in New Zealand (Bell 1992:64). Several colour lithograph reproductions of an oil painting based on this watercolour had wide circulation and the original watercolour dated 1847 has been recently acquired by the Sarjeant Art Gallery in Whanganui. Another composite scene derived from Gilfillan of the same village showing this same storehouse was published in 1849 by W. Tyrone Power under his own name (Power 1849:160). In a final version, Phillipps (1966:45) published a sketch of the rua tahuhu alone copied directly from Gilfillan's original sketch, as an example of a "kumara pit, Putiki pa, Whanganui".

Gilfillan's original sketch clearly shows a low storehouse front constructed of roughly-hewn vertical upright slabs, probably inserted below ground-level. These slabs are simply butted together with no battens over the joins. At the centre of this triangular front is a stylised frontal figure of indeterminate gender carved in high relief from one large timber slab with its head projecting to form the highest point of the apex. This carved slab surmounts a separate square uncarved door constructed of three vertical panels of timber, with its lower edge resting on the ground level. This door swings on what are clearly two large European hinges attached at top and bottom of the door. These two hinges have been transformed into a more traditional-looking single horizontal bar across the door in the otherwise very accurate copy published by Phillipps. The construction of the rest of this storehouse cannot be seen in Gilfillan's sketch, but it provides good detail of the construction of the front.

Another entrance carving from a rua tahuhu appears in Gilfillan's sketch, standing detached on the ground beside the woman on the left. Further away in the central background,

Gilfillan has included another rua tahuhu, but this one has a plain slab above the door. In a note written across the top of this sketch, Gilfillan comments that the carvings were “invariably” painted red.

On the clear evidence of Gilfillan’s sketch, the carved component of the semi-subterranean storehouse functions as an architectural member above the door and could therefore justifiably be called a perepere. On the carving itself, the details of the face and the general proportions seem to have been rendered authentically. Carved spirals are shown on the shoulders and hips, but unfortunately the placement of the hands is not clear. They are probably splayed across the chest.

B. Rua tahuhu at Kaweka (Ranana), Whanganui River, 1861

Fig. 3

This rua tahuhu was sketched by James Coutts Crawford, an early Wellington settler and geologist, at Kaweka (also known as Ranana or London) on the Whanganui River, on 24 December 1861. Crawford was on his way up-river to inspect reported coal seams on the Tangarakau River and his party stopped at Kaweka only long enough to pay their respects to an elderly resident (Crawford 1880:100).

The quick pencil sketch in Crawford’s field sketchbook (E 47, Alexander Turnbull Library, Wellington) shows only the front of the rua tahuhu with no detail at ground level. As in the rua tahuhu sketched by Gilfillan (A), the Kaweka example has a front consisting of large vertical slabs of timber butted and tied together at their edges. The top edges of these slabs,

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Fig. 3. Rua tahuhu (B) at Kaweka (Ranana), Whanganui River, 1861. Sketch by J.C. Crawford.
Photo: Alexander Turnbull Library, Wellington 147455 1/2.

which could justifiably here be called epa, are cut much more neatly than the rough slabs of Gilfillan's rua tahuhu (A) but there are still apparently no maihi or bargeboards unless Crawford has seen only a detached front. In an unusual structural arrangement, the carved element of this rua tahuhu is placed between a short epa at each side with the three panels forming an insert resting above what appears to be a small low central uncarved door. If this is the case, then the carved element could again be called a perepere.

Crawford has devoted most of his artistic effort to show the detail of the carved figure. It is a frontal stylised figure of indeterminate gender with both hands on its stomach. In careful detail, Crawford has shown that the narrow stomach terminates at the top in a small profile manaia face just below the pendant protruding tongue.

C. Rua tahuhu at Pipiriki, Whanganui River, 1861

Fig. 4

On the same Whanganui River journey described above, Crawford reached Pipiriki in the evening of 24 December 1861 and was delayed there several days by heavy rains. Maintaining his interest in food stores, he sketched another rua tahuhu at Pipiriki where he had the time and leisure to fill in more detail. However, neither his diary nor his published account of this trip make any mention of the foodstores encountered here or at Kaweka.

Crawford's fieldbook sketch shows the rua tahuhu (which he called a potato pit) set within its own small fenced enclosure. Again the front consists of vertical thick timber epa set

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Fig. 4. Rua tahuhu (C) at Pipiriki, Whanganui River, 1861. Sketch by J.C. Crawford. Photo: Alexander Turnbull Library, Wellington 147460 1/2.

directly into the ground and forming a neat roof line but without any bargeboards. The low sides are probably made with similar slabs of timber or perhaps some other material. On the roof, Crawford has shown neat rows of shingles or perhaps bundles of rushes or some similar material tied together, without any projecting over the side as an eave.

On the large central slab of the front, a high relief frontal figure with no indicated sex, is carved with all of its head projecting above the roof line. The joins with the epa on both sides of this slab are covered by a batten lashed over at regular intervals. Below this carved slab is a separate low panel which appears to be much too low to form a doorway and is therefore probably a permanent sill or paepae to the entrance. If this is so, the carved panel is the door and can therefore be called a kopani.

D. Rua tahuhu at Putiki Pa, Whanganui, 1860s

Fig. 5

This photograph is included in an album, now in the Alexander Turnbull Library, of New Zealand photographs compiled by Ensign B.G. Haines of the 18th Royal Irish Regiment while on active duty during the New Zealand Wars. This regiment arrived in Auckland in 1863 and did not leave New Zealand until 1870, the last imperial corps to leave. Therefore, this photograph was probably taken sometime in the early to mid 1860s. The photographer was probably W.J. Harding (John Sullivan, Alexander Turnbull Library, pers. comm. 17 November 1989). Another photograph of the same scene obviously taken by the same photographer on the same occasion but with a Maori man in the foreground has been seen in a photograph album held privately in Whanganui.

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Fig. 5. Rua tahuhu (D) at Putiki Pa, Whanganui, 1860s. Photo: B.G. Haines Album, Alexander Turnbull Library, Wellington.

In this only known photograph of a carved entrance in place on a rua tahuhu, the same constructional details are seen as in the earlier sketches. Vertical timber panels form the front wall, with the central position taken by a high relief frontal carved figure whose shoulders meet the line of the roof. The joins between this central carved panel and flanking epa are covered by battens lashed in three places at intervals down each side. Below this carved panel is a square doorway, about 60 cm high and 55 cm wide, judging by the known dimensions of the carved panel above it. The doorway is outlined by a projecting flat plain timber lintel and a projecting plain jamb on the right side. The left side lacks this projecting jamb and seems to indicate that the plain flat timber door itself swings from here on some type of hinge. The lower edge of the door clearly terminates slightly above ground level, giving clearance for the door to swing open. This photograph therefore definitely confirms that in this case the carved component is functioning as a perepere.

ENTRANCES OF RUA TAHUHU IN MUSEUM COLLECTIONS

It is not always possible to determine whether these carvings actually served as the door (kopani) or the slab over the doorway (perepere) of rua tahuhu, but whichever is the case, they form a distinctive category of artefact. They can be characterised as an upright rectangular slab or panel of timber bearing a full-length frontal figure carved from the solid in high relief, with its head or part of its head projecting above the upper edge of the panel. The rear of the panel is usually flat, often with the pattern of adzing still visible. Most have some lashing holes spaced down each side. Some have various rebating or bevelling on the edges to fit into a framed aperture. A very limited number have a horizontal tunnel behind the raised body for a beam to be inserted as a locking device. These distinctive features are summarised in a comparative table listing all the recorded examples (Table 1).

Table 1. Summary of distinctive features of rua tahuhu entrances. Tick = present/yes; - = absent/no; ? = uncertain.

CARVING	LOCALITY	Lashings	Bevels/Rebates	Slot for beam	Male/Female	Perepere	Kopani	Height (cm)	Width (cm)
A	Putiki	?	?	-	?	✓	-	?	?
B	Kaweka	?	?	-	?	✓	?	?	?
C	Pipiriki	✓	?	-	?	-	✓	?	?
D/E	Putiki	✓	-	-	M	✓	-	118	55
F	Sth Taranaki(?)	✓	-	-	?	?	?	81	41
G	Waipuka	✓	✓	-	F	?	?	99	42.5
H	Putikituna	✓	-	-	F	?	?	76	41
I	Koriniti(?)	✓	-	-	?	?	-	122	48
J	Whanganui(?)	✓	✓	-	M	?	?	114	48
K	Waikato	✓	-	-	?	?	?	63	30
L	Whanganui(?)	✓	✓	-	?	✓	-	80	45
M	Okato	✓	✓	✓	F	✓	-	61	39
N	Taranaki(?)	✓	-	-	M	✓	-	66	20.2

Personal investigations in museums in New Zealand and worldwide, along with reference to David Simmons's records of his surveys of Maori artefacts in overseas museums (now held in Auckland Museum), have revealed the following examples of carved kopani or perepere:

E. Entrance of rua tahuhu, from Putiki, Whanganui

Fig. 6; Auckland Museum 52381

Nothing was recorded in museum files about the provenance of this carving but happily it has been recognised as the actual perepere on the rua tahuhu in the Putiki photograph preserved in the Haines album (Fig. 5). On the basis of this photograph, the carving is definitely older than the 1860s and could probably date back for another 20 years at least, that is to about the 1840s.

This carving is 118 cm high and 55 cm wide. It has a flat back, three lashing holes spaced down each side and no bevelling or rebating on the edges. The high relief figure and the panel itself are all carved from one solid piece of timber with the lower arms and legs cut free of the background. This figure is clearly male, with a small but erect penis and testicles in low relief on the base of the stomach. He has five fingers on each hand, pegs for paua shell eye inserts, and one tooth on each side of his mouth. His carved surface decoration consists of whakarare on head and body, pakura on lips and arms, rauponga spirals on corners of mouth, hands and thighs, and plain spirals on shoulders and elbows. On the background panel are unpierced takarangi spirals and manaia figures, with a small wheku face between the legs of the principal figure. A heavy coat of red paint applied in the past by the museum obscures the surface, but the carving was probably done with early metal tools.

F. Entrance of rua tahuhu, from Whanganui district

Fig. 7; Pitt Rivers Museum, Oxford 1923.87.188

No definite locality of origin is recorded for this carving but it was formerly item number 45 in the collection of Charles Smith who lived in Whanganui from 1859 to 1900. It was collected by him, probably in the Whanganui area in the 1860s, and purchased by the Pitt Rivers Museum in 1923.

Measuring 81 cm high and 41 cm wide, this carving has three lashing holes down each side. There is no bevelling or rebating on the edges and no slots for pegs or bars to be inserted. Carved in high relief, probably with stone or early metal tools, the figure has a plain head and body with a rauponga spiral on its left shoulder and plain spirals on the other shoulder and both hips. Pakura patterns cover the arms, hands and legs, but some of this surface carving is unfinished on the figure's right side. On the left hand are four fingers but only three fingers on the right hand. Gender is not indicated. The ancestor name, Paikapoia, has been lightly inscribed down the body, probably at a later date than the original carving. Most indications are that this carving was probably produced sometime about the 1820s or 1830s.

Simmons (1985:93) described this carving as a pataka doorjamb. This can be questioned on the evidence assembled here, which clearly suggests that it served as a perepere or, less likely, as a kopani. On both stylistic grounds and possible locality of origin, he attributed it to either Ngati Ruanui or Nga Rauru tribal groups, which seems reasonable even if the grounds for this stylistic attribution are not made clear.

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Figs 6-9. Entrances of rua tahuu. 6. E, Putiki Pa, Whanganui. Auckland Museum 52381. Photo: Auckland Museum. 7. F, Whanganui district. Pitt Rivers Museum, Oxford 1923.87.188. Photo: Pitt Rivers Museum, Oxford. 8. G, Waipuka, junction of Mangawhero and Whangaehu Rivers. Whanganui Regional Museum 1886.15. Photo: R. Neich. 9. H, Putikituna, Tangarakau River. Whanganui Regional Museum 1886.10. Photo: R. Neich.

G. Entrance of rua tahuhu, from Waipuka, Whangaehu River

Fig. 8; Whanganui Regional Museum 1886.15

Assumed to be part of the original S.H. Drew collection which was purchased in 1892 to form the Whanganui Public Museum, present museum files do not record the place or the date of collection of this carving. The Whanganui Museum Annual Report of 1899 confirms that it was in the museum collection by that date. In an unpublished address delivered to the Dunedin Science Congress of 1935, T.W. Downes (1935) indicated that this carving was “said to have been dug up at Waipuka, near where the Mangawhero joins the Wangaehu River”.

Waipuka seems to be an elusive locality, not shown by Rev Richard Taylor in his detailed 1843 census maps of the Mangawhero and Whangaehu River valleys (Ms 297/37, Rev. Richard Taylor Collection, Auckland Public Library). However, as Walton (1985) has documented, a considerable Maori population had previously lived in about 19 pa on higher ground along the lower valleys of these two rivers. None of these pa were still occupied from the 1840s onwards, but they had been replaced by several settlements on the richer soils of the narrow valley floors, containing about 100 people in total. Judging from the apparent age of this carving, it was probably associated with one of the pre-European sites in this area. These valleys are within the tribal territory of Ngati Apa (Smith 1910:map 1), although the inhabitants of the Mangawhero valley maintained close relationships with the people of the Whanganui River, even moving there to Parikino to avoid raiders from Taupo in 1845.

Measuring 99 cm high and 42.5 cm wide, this very old and weathered piece of stone-tooled carving has five lashing holes spaced down the figure’s true right side. Only one lashing hole remains on the other side but others were no doubt present in the lost portion of the carving. There are two old lashing holes on the lower area of the carving and one new large metal drill hole in the figure’s left foot. No obvious bevelling is apparent but the lower area across the feet has been reduced in thickness, perhaps to accommodate a sliding bar across the front or to fit behind another panel below. The back of the carving is flat and eroded. The figure represented is clearly female with a large vulva. She is carved in low relief with all of the body engaged in the slab leaving no recesses for slots or pegs. Her eyes are carved with large studs to hold paua shell inserts and the mouth has four teeth. Four fingers are carved on her left hand and three on her right. Surface decoration consists of plain spirals on lips and face, between the arms, above her hips and on each shoulder, rauponga on her body and legs, and rauponga spirals on her hips. Judging from the stone-tool work and the general appearance of this carving, it would seem to be one of the earlier examples of a rua tahuhu entrance, dating perhaps from the early 1800s.

Downes and later Max Smart, both prominent Whanganui experts on Maori topics, were unsure what type of architectural member this carving was, opinions ranging from a tiki to a tekoteko (Files, Whanganui Regional Museum). Simmons (1985:34) described it as a doorway figure of a pataka, but in view of the evidence assembled here, its function as a perepere or kopani is much more likely.

Simmons also claimed that it represented a typical example of Whanganui River Te Ati Haunui-a-Paparangi tribal carving style. However, the documented locality of origin presented above indicates that this should be regarded as a Ngati Apa carving. There are certainly very close similarities with the style of the rua tahuhu carvings from the Whanganui River as would be expected from the close relationships between these tribal groups, but the stylistic differences also need to be respected in any definition of tribal styles. This Ngati Apa carving therefore presents an opportunity to make a distinction between Whanganui and Ngati Apa

carving styles, an opportunity expressly noted as unavailable at the time by Mead (1986:64). Certainly, a comparison of this Waipuka carving with the other Whanganui rua tahuhu entrances presented here (E,I,J,L) does highlight some interesting differences (see below).

H. Entrance of rua tahuhu, from Putikituna, Tangarakau River

Fig. 9; Whanganui Regional Museum 1886.10

Also assumed to be part of the original S.H. Drew collection, this carving was in the museum collection by 1899. T. W. Downes referred to it in his same 1935 presidential address as having been “found in a cave near Putiki-tuna, twelve miles up the Tangarakau - which is a tributary of the Whanganui River about ninety miles from its mouth”. On the side of the carving itself, an inscription in ink reads “Tuka Rangatai of Tangarakau 30-9-92”, recording the name of the Maori person who found it or passed it on to the European collector and the date when this transaction occurred. Putikituna can be reached by road, ten miles eastward from Whangamomona via Kohuratahi, and had a post office at the turn of the century. Downes (1923:38) described the Maori settlement of Putikituna as being the largest of several Maori settlements along the Tangarakau River. Today there is nothing left of the settlement, but a Putikituna Road and Stream running into the Tangarakau River appears on modern maps.

Measuring 76 cm high and 41 cm wide, this is a very solid carving almost certainly carved with stone tools. Most of it is still in sound condition but the face has been damaged and the figure's true right side has been split away at some earlier period. However, it continued to be used after this piece was lost. From the rear, five lashing holes are seen spaced down both sides. From the front, four appear on the figure's left side, while on the present right side three later lashing holes pass through the figure's hand, leg and foot. The hole in the leg has a recessed groove cut for the lashing cord to run flush with the surface.

No bevelling or rebating appears on the edges of the slab. The back is flat and eroded but adze marks still show on the surface. The central figure is carved in deep high relief but no parts are disengaged from the background except for the looped tongue. The domed head with slight central ridge is thrust forward. Most of the head and body surface has been left plain but on the chest below the tongue, the eroded traces of a manaia hand or head perhaps with its body below, can be discerned. Pegs for paua shell inserts have been carved in the eyes. Both hands, but of disparate sizes, are represented in low relief on the body, with three fingers on the left hand and three fingers plus a spurred thumb on the right. Similarly, the feet are in low relief on the flat surface of the background slab, along with some matakupenga surface decoration. Surface decoration is restricted to rauponga over the eyes and around the lips, and on arms and legs, with rauponga spirals on the shoulders. An elongated plain spiral is carved on the remaining knee. The elbow is represented by a plain raised round disc. Although now much eroded, female gender is clearly indicated by a carved vulva. Most of the north Taranaki swamp-recovered carvings similar to this are generally considered to date from the later eighteenth or very early nineteenth centuries and this would also seem to be the most likely date for this piece.

In his presidential address, Downes (1935) wondered if this carving might have served as a sliding panel in some unspecified architectural construction but realised that the lashing holes probably ruled this out. In 1967, Max Smart was of the opinion that it “is more like a substantial cover for a pataka doorway or a food pit - rua” (Files, Wanganui Regional Museum). Simmons (1985:34, 35, 91) considered whether this carving might be a tekoteko but settled on calling it a doorway, doorslab, or door for a raised pataka, including it as a key

example in his discussion of the Taranaki form of raised pataka. On the evidence of the four illustrated rua tahuhu presented above, a function as part of the entrance to a semi-subterranean rua tahuhu seems much more likely, confirming Smart's opinion.

The tribal map in Smith (1910) would place Putikituna in Ngati Haua territory. Simmons (1985:34, 90) accepts this carving as coming from Ngati Haua territory, while pointing out its similarity to Te Ati Awa carvings from Manukorihi and even suggesting that "it was possibly carved by a carver from Te Ati Awa but in a Ngati Haua style". The Putikituna carving certainly displays close similarities to Te Ati Awa carvings, but if, as Simmons agrees, this is the only known early Ngati Haua carving, then it is premature to base such a supposition on the same solitary example.

I. Entrance of rua tahuhu, from lower Whanganui River

Fig. 10; Museum of New Zealand, Wellington ME.1372

This carving is part of the John Handley collection, purchased by the museum on 25 May 1905. No locality of origin is recorded but written in pencil on the back of the carving, presumably by Handley, is the note "Parerua a Pamoana". This reference to Pamoana may indicate that Handley obtained the carving from Ngati Pamoana of Operiki and Koriniti, or if not from Koriniti itself at least from somewhere on the lower Whanganui River. The carving is very similar to the perepere of the rua tahuhu sketched by Crawford at Kaweka on the Whanganui River except that where the Handley carving has a small reversed figure carved at the top of the stomach, the Crawford sketch shows a profile manaia face. Many other pieces in John Handley's collection came from the Whanganui district. Therefore, the evidence of a lower Whanganui River origin for this carving seems fairly sound and is supported by the style of the carving.

Measuring 122 cm high and 48 cm wide, this large heavy totara carving probably dates from about the 1840s period. Two square-cut lashing holes are spaced down each side of the plain flat base panel with no bevelled or rebated edges nor any beam or pegging slots. The back is flat and roughly adzed with metal tools. Now missing one forearm, the wheku-faced figure stands out in 12 cm high relief from the flat slab, with its lower arms, legs and body actually disengaged from the supporting slab. Surface decoration is pakura on the head, very wide rauponga on eyes and mouth, plain spirals and pakura on the arms, rauponga spirals on the buttocks, and rauponga on the legs. Both ears have perforations for attaching feathers or other decorations. The boldly outcurved stomach terminates just below the tongue as a small upside-down wheku figure with its feet pointing toward the tongue (Fig. 11). No definite gender is indicated but the buttock spirals and bold stomach which could perhaps be read ambiguously as an erect penis suggest a male figure.

Handley's reference on the back of this carving to a "parerua" is an important independent confirmation of the function of this carving, perhaps even supplying the name by which such carvings were known on the Whanganui River. The "pare" or lintel of a rua is a very apt description of these carvings. In all respects, both stylistically and structurally, this carving is a very typical example of the standard Whanganui River rua tahuhu entrance, or perepere as termed in this article.

J. Entrance of rua tahuhu, from Whanganui district

Fig. 12; Museum of New Zealand ME. 4551

Presented to the museum in May 1930 by Mrs W. Mantell, this carving was part of the

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Figs 10-13. Entrances of rua tahuhu. 10. I, lower Whanganui River. Museum of New Zealand ME. 1372. 11. Detail of entrance I. 12. J, Whanganui River. Museum of New Zealand ME. 4551. 13. Detail of entrance J. Photos: R. Neich.

large collection assembled by her husband Walter Mantell, a prominent early settler in the Wellington and Otago areas and later a politician on the national scene. No locality of origin was recorded by Mantell for this carving and his collection was drawn from many parts of the country, including the Whanganui area. With wide interests in Maori studies, Mantell was presumably active as a collector from the time of his arrival in New Zealand in 1840 until sometime before his death in 1895. This long time span does not help pinpoint any possible date of collection for this carving.

Measuring 114 cm high and 48 cm wide, this is a large totara carving almost certainly cut with metal tools. Three lashing holes on the figure's right side and two or maybe three lashing holes on the left have been drilled with modern drills. The base board is flat and plain with a flat back and a very slight bevel down the front edges. There are no signs of any slotting beam arrangement. Carved in high relief about 16 cm deep, the figure is disengaged from the base board behind its lower arms, legs and body. Unlike all of the other rua tahuhu entrances with their stylised figures, this one has a naturalistic face with paua shell eyes and a small mouth. Where the two hands rest on the stomach, their fingers have been replaced by an upside-down wheku face in relief (Fig. 13). Prominent knobs mark the elbows and the ears are pierced for decoration. Otherwise all of the body is left plain with no surface decoration except for a lightly-incised large plain spiral on the figure's left buttock. As well as this indication of a male rape tattoo on the buttock, the outline of small male genitals with an erect penis is still to be seen, even though they have been shaved off almost flush with the surface of the lower stomach.

An early museum label attached to the front of the body calls it a tekoteko, but it is obviously another example of a rua tahuhu entrance. Without any external prompts as to the date of this carving, its age can only be estimated on the use of metal tools and its general appearance, suggesting probably sometime about the middle of the nineteenth century. Stylistically, the carving fits within the canons of a general Whanganui style.

K. Entrance of rua tahuhu, from near Te Awamutu

Fig. 14; Wagener Museum, Houhora

Obtained by the Wagener Museum from a private collection, a note in the museum records states, "very old stone tool carving from swamp west of Te Awamutu". No other information is available but all the indications of stone adze markings and the archaic nature of the carving confirm that this is a very ancient example.

Measuring 63 cm high and 30 cm wide, which makes it smaller than most of the others, this flat panel has one large square-cut lashing hole at each corner. Also unlike all the other rua tahuhu carvings described here, this panel has simply a flat low relief carved face with no body features on the plain flat panel. Instead, facets left by a stone adze leave the surface with a dappled appearance. Carving of the stylised face is very rudimentary, with large ridged eyes and no surface decoration. No gender is indicated.

Simmons (1985:103) called it a kuwaha, that is, a doorway of a pataka. However, despite the differences noted above, the overall form and lashing arrangements on this carving agree with all the other rua tahuhu entrances described here.

Simmons (1985:103) has rightly pointed out the stylistic relationship of the head on this carving to the headform of the figure carved on the paepae of a pataka found in a swamp at Chartwell in the Waikato. He interprets this relationship to indicate a similarity in pataka construction between Waikato and Taranaki/Whanganui. However, in view of the argument presented here, the finding of this rua tahuhu entrance at Te Awamutu simply indicates that

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Figs 14-17. Entrances of rua tahuhu. 14. K, near Te Awamutu. Wagener Museum, Houhora. Photo: R. Neich. 15. L, no locality recorded. Cambridge University Museum of Archaeology and Anthropology Z 5102. Photo: Cambridge University Museum of Archaeology and Anthropology. 16. M, Okato, Taranaki. Taranaki Museum A83.091. Photo: L. Tancred, Taranaki Museum. 17. Lashing holes in entrance M, viewed from the rear.

rua tahuhu of the same form as those of Whanganui/Taranaki were built at least occasionally, in the Te Awamutu area. This extension of the Taranaki rua tahuhu form into the Waikato is then seen to be in accord with the extension of the Taranaki and Hauraki sinuous type of carved figure into the Waikato as evidenced by the figures on the Chartwell paepae.

L. Entrance of rua tahuhu, no locality recorded

Fig. 15; Cambridge University Museum of Archaeology and Anthropology Z 5102

Measuring 80 cm high and 45 cm wide, this is obviously a very ancient carving, shaped with stone tools in pre-European times. Originally it had a large lashing hole at each corner but the lower true right corner has been broken away. A rebated edge extends completely across the lower portion of the panel, suggesting that it is intended to fit in behind a lower panel. This may indicate that the carving functioned as a perepere with a lower kopani resting in against its lower edge. However, the sharpness of the cut for this rebate might indicate that it is a later alteration, perhaps in order to fit the carving into a non-traditional structure. The rear side is flat and very weathered with a square hollow roughly cut into the lower central area. The frontal figure stands out in low relief, with no parts disengaged from the flat background and no provision for a slotted beam or pegs. Surface decoration is now very worn but was also minimal originally, being restricted to broad flat crossed lines on the tongue and large square-cut pakati notches on the shoulders. Both hands originally rested on the chest. The lower portion of the stomach has been lost, thereby removing any definite indication of gender.

In stylistic terms, a Whanganui area style seems to be a reasonable attribution for this carving, as suggested by Simmons (1985:96) although it also shares some features of Ngati Apa style as exemplified by the rua tahuhu entrance from Waipuka (G).

M. Entrance of rua tahuhu, from Okato, Taranaki

Fig. 16; Taranaki Museum A83.091, (Z3287)

As described by Day (1982; 1983:137), this carving was found by Mr Keith Mundell in April 1982 while digging a drain along the edge of a swamp (Grid reference N108/417751 2nd edition) on Mrs A. Campbell's farm, Komene Road, Okato. This swamp is associated with the Pukehoe pa complex and other artefacts such as stone and wooden pounders, a pumice pigment pot, a weaving peg, a kumete and other wooden items have been recovered from the same area.

Measuring 61 cm high and 39 cm wide, the carving has a maximum depth of 13.5 cm. All carved from one solid piece of timber, the background slab has been cut down to 2.5 cm thick, and tapers in width from 39 cm across the bottom edge to 35 cm across the top. The true right edge of the panel has been broken away so that no lashing holes remain except for the broken edge of a lashing hole in the lower corner. On the true left side there are four lashing holes spaced at intervals of 10 cm, 20.5 cm and 27 cm apart. However, from the rear another lashing hole appears on this edge at about one third down from the top, its exit on the front obscured by a tightly-packed remnant of fibre lashing. In addition to these lashing holes along the sides, there is another on the top edge to the true right of the figures's head, and another in the centre of the lower edge between the figure's feet (Fig. 17). All of these lashing holes were originally cut more or less square rather than drilled, but subsequent wear has rounded them off into a semicircular section. The rear of the panel has been adzed flat and smoothed off over very straight-grained timber. None of the edges on the rear are rebated or bevelled. On the front, the top of the background panel has been bevelled off, while cutting across the

lower legs of the figure, a 1.5 cm wide rebated recess runs right across the lower edge of the panel. About halfway down the panel, a 2 cm wide slot for a horizontal crossbar cuts across the lower arms of the figure and runs as a tunnel behind the raised body of the figure (Fig. 18).

In overall form, size and constructional features, this carving from Okato fits well within the range of rua tahuhu entrances already described above, contrary to its description by Day (1982; 1983:137) and Simmons (1985:35) as part of the entrance to a raised pataka storehouse. Most notably, the Okato carving shares the lashing holes of all other rua tahuhu entrances and the rebated recess across the front lower edge as seen in entrances G from Waipuka and L in the Cambridge University Museum. The Okato carving differs from these in the greater number of lashing holes including some across the top and bottom edges, and particularly with its transverse slot for a beam running behind the body, all elaborate and deliberate provisions for holding the carving in place. These features all appear to be integral elements of the

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Figs 18-19. Entrances of rua tahuhu. 18. Side view of entrance M. Taranaki Museum A83.091. Photo: R. Neich. 19. N, no locality recorded. British Museum 1630. Photo: British Museum.

original construction and not later additions which might have suggested a later different reuse. The rebated recess across the lower front edge of entrances G, L, and now M, has been interpreted as possible evidence of their function as perepere with a lower kopani butting against the recess. However, this rebate could just as easily serve as the lower edge of a kopani fitting in behind a lower sill of an entrance. The slotted beam arrangement might also indicate a function as a kopani where quicker removal and refitting was a requirement but the presence of so many lashing holes would still make frequent opening a major task. On the basis of these arguments, it would therefore seem most likely that the Okato carving served as a perepere of a rua tahuhu, perhaps with the unusual provision of a slotted beam to hold it even more tightly in place.

Standing out in high relief against a flat background, only the area of the stomach where the slotted tunnel passes through is actually disengaged from the slab. Only the rounded peak top of the head of the figure projects up above the line of the base slab, unlike virtually all of the other carvings described here in which almost all of the head projects above the panel. The eyes with sockets for paua shell inserts are deepset below large semicircular brows, and the ears are shown as round plugs. Four semicircular teeth surround a wide ridged tongue. Large three-fingered hands rest on each thigh which are splayed to prominently display a large vulva, clearly denoting this figure as female. No surface decoration appears on the neck or body but there is ritorito on the upper eyebrows and around the mouth. The surface decoration on the arms was probably pakura with a spiral at each shoulder and the fingers bear ritorito. On the upper legs, haehae extend from a spiral at each hip. Elbows and knees are each marked by a plain raised disc. Both feet have three large toes which are webbed in outline. Most of the surface of the background slab is left plain except for low relief matakupenga and double spirals on both sides above the arms of the figure.

As both Simmons (1985:89) and Day (1982:84) have noted, this carving was found within the Taranaki tribal territory. Pukehoe was a major pa of the Nga Mahanga hapu of Taranaki iwi in the late eighteenth and early nineteenth centuries. It was from this pa that Tamarerehau planned the successful defence of nearby Ngaweka pa from a Waikato taua in 1820. By 1860, his son Komene was the major chief in the pa. The impressive stone sculpture, Hine-o-Tanga was also originally on this pa, indicating some measure of the importance of this pa on the Taranaki coast (K. Day, pers. comm. 18 March 1996). The Taranaki tribal carving style is distinctive within a wider Taranaki regional carving style, particularly on the basis of differences between Taranaki and Te Ati Awa tribal styles (Day 1983:184-185). Te Ati Awa figures have very pointed foreheads and long narrow serpentine bodies with a marked central ridge or broad serpentine bodies. Taranaki tribal figure carvings on the other hand have only a slightly pointed forehead or no forehead at all, and bulbous or rounded bodies which still retain some serpentine characteristics. However, Simmons has suggested that this particular carving may have been a gift from Te Ati Awa, mainly on the presence of its peaked forehead, a Te Ati Awa stylistic feature also noted on this carving by Day (1983:185).

N. Entrance of rua tahuhu, no locality recorded

Fig. 19; British Museum 1630

Collected in New Zealand at an unrecorded locality and date by Captain E. Stanley of the Royal Navy, this carving then came into the collection of the Royal United Service Museum, Whitehall. Since this collection was dispersed in 1863, this carving must have been collected sometime in the first half of the nineteenth century. It later came to the British Museum as part of the Christie collection.

Measuring 66 cm high and 20.2 cm wide at the base, this carving has two squared lashing holes on the figure's true left side, and one lashing hole and the remnants of another on the figure's right side. The back is flat and there is no bevelling or rebating on the edges. Its strikingly naturalistic head is tilted slightly to one side and projects completely free from the very reduced background slab behind the body. The face with closed slit eyes bears a complete male tattoo. Bulging male genitals are carved between the buttocks which are turned outwards so that his legs pass up and over his arms, ending in wedge-shaped feet without toes. Both hands have four fingers and a reduced thumb. Arms and body are left plain except for his navel, as is the background surface. Only his buttocks and upper legs have surface decoration, of *rauponga* and *rauponga* spirals.

This carving is considerably narrower in width than any of the others, perhaps suggesting that it may have been a non-functional replica or model. This would also be consistent with its fresh surface showing a lack of the effects of weathering. Simmons (1985:89) referred to this lack of weathering as possible evidence for its function as a figure over the door of a raised storehouse where it would have been protected by the porch roof. However, apart from its reduced size, in all respects of form and attachment provision, this carving fits within the range of *rua tahuhu* entrances described above. If the arrangement of the front panels of the *Kaweka rua tahuhu* entrance (B) is taken into account, the width of the actual carving does not necessarily always reflect the width of the doorway below it. With this leeway, the narrowness of the British Museum carving does not necessarily preclude its function in a full-size *rua tahuhu*. Given the extreme projection of its head and its high narrow proportions, any function as a *kopani* appears to be impossible, again supporting the interpretation of these carvings as *perepere*, or their equivalent local term.

In stylistic terms, this carving is very unusual among this assemblage with its naturalistic human figure. However, the interlocked arms and legs betray a Taranaki origin or influence, as do the wide diamond-shaped *pakati* notches in the *rauponga* surface decoration. Simmons (1985:89) interpreted this carving as a double figure, with parts of a male and female in the act of copulation, with the buttocks belonging to the female. However, this seems to be unlikely in view of the male buttock tattoo or rape represented by the *rauponga* spirals. While it is difficult to be certain, this carving may have been executed with early metal tools.

CONSTRUCTIONAL POSSIBILITIES

This study has demonstrated that there are many problems with the suggestion that these carvings were fitted as figures above the door in the back wall of the porch in a raised *pataka* storehouse. With their prominent heads projecting above the background panel, it is difficult to conceive how these carvings could be fitted into the structure of the back wall. In all of them, the rear of the projecting head is a flat extension of the same flat plane of the rear of the main slab. This means that the head could not have been projected forward in front of the wall. It may be more likely that they served as doorway covers in a *pataka*, but again with the head in the same plane as the main slab, how would they fit into the door space?

Adding further weight to the argument against their use in *pataka*, no early textual or illustrative evidence has ever been located to show these types of entranceway carvings in the porch of a raised *pataka*. Admittedly, the early visual evidence of any raised *pataka* storehouses in the Taranaki/Whanganui region is very meagre, making any argument based on it rather tenuous.

The only known illustration of a Taranaki *pataka* is the famous watercolour by Charles Heaphy showing the elaborately-carved *pataka* at Otumatua Pa in 1840 (Barrow 1969:Fig.157).

Surely, if the doorway of this pataka had been carved as strikingly as the maihi and paepae, a draughtsman as thorough as Heaphy would have included some indication of it. Instead, the doorway of this pataka is shown as a plain rectangular shape against a plain porch back wall.

Indeed, much of the early visual evidence of Whanganui district pataka also suggests that they often had plain doors and doorways. The raised pataka in Gilfillan's sketch at Putiki (Fig. 2) has a totally plain entrance, as does the derivative pataka in his 1847 watercolour of Putiki. In a sketch by Charles Heaphy showing "Monuments in a tapued Pah, Wanganui River", the pataka is clearly shown with a plain doorway (Chapman 1870:86). Crawford's sketch of the tangi that he witnessed between Topia Turoa and the old woman that they met at Ranana on the Whanganui River on 24 December 1861 includes a pataka in the scene, again clearly with a very plain doorway (J.C. Crawford sketchbook E41/p.49, Negative 147472 1/2, Alexander Turnbull Library, Wellington). This preponderance of plain pataka doorways in the visual record of Whanganui pataka is reflected in the paucity, or perhaps even total absence, of carved pataka doorways from the Whanganui district in museum collections.

Obviously, many questions still remain regarding the finer points of exactly how these entrance carvings fitted into the overall construction of a semi-subterranean storehouse, but the general technical features are clear. All of them have at least two lashing holes down the side and occasionally one at the lower edge, a structural arrangement that suggests a relatively permanent fitting. On the evidence of the early field illustrations, examples A, B and D/E are definitely functioning as perepere. Example C at Pipiriki is considered to be a possible kopani only on the evidence of Crawford's sketch which is amateurish with inconsistent perspective, perhaps giving a misleading impression of the possible height of a doorway below the carved perepere and extending below the surrounding ground level. The evidence of rebates and bevelling along certain edges of these carvings is inconclusive, as this provision would have functioned in various possible constructional relationships. A comparison of their sizes (Fig. 20) shows a fairly smooth even spread with a very narrow range of widths except for the aberrant N and K carvings, suggesting that they all fall within the one class of object.

While the above evidence is not totally conclusive, I would maintain that all of these carvings are most probably designed to serve as perepere, probably with a plain door fitted below, either on lashings, pegs, or later on hinges. This door is then easily removable to retrieve kumara from the store at frequent intervals.

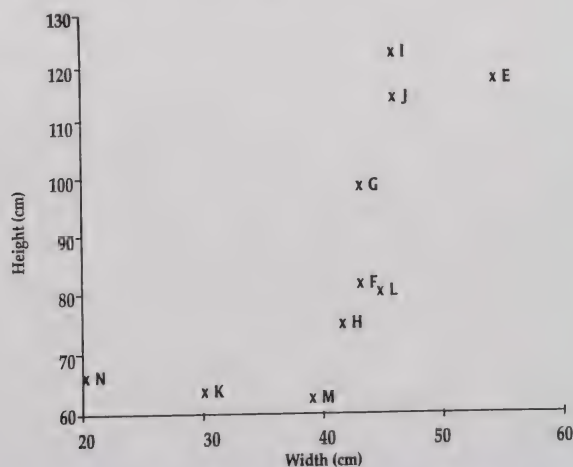


Fig. 20. Comparison of sizes of rua tahuu entrances.

Another type of storehouse carving from other areas of New Zealand should be mentioned here, to avoid confusion with rua tahuhu entrances. Only two examples of this other type have been located, one in the Musée d'Histoire Naturelle, at Rouen, France (Fig. 21) and another in the Hunterian Museum, Glasgow (Fig. 22). While superficially similar to rua tahuhu entrance carvings, these two are different in many significant features. In both, the head of the figure which is male, is thrust forward to leave a considerable space between the rear of the head and the plane of the rear of the main slab. This would allow the upper rim of the main slab to be inserted into a doorway space, leaving the head to project upwards in front of the wall above the door. Neither of these two have any lashing holes down the sides, but both have a slotted space on each side behind the body where a peg could be inserted to hold the slab in place. The Glasgow carving is in Arawa style and is associated with other carvings of a raised pataka, including its kuwaha, presented to the museum by a William Clark in 1864. The Rouen carving is unlocalised but has an East Coast Ngati Porou aspect. Although rarely documented or collected, both of these carvings appear to be the door cover for a raised pataka storehouse. Such a carving is indicated in place, again from the East Coast, in the Rev. Richard Taylor's 1839 sketch of a pataka at Poverty Bay (Simmons 1985:31). Therefore these two carvings in Glasgow and Rouen seem to represent another class of Maori artefact, similar in form and perhaps symbolism but geographically and architecturally distinct from the class of rua tahuhu entrances described here.

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Figs 21-22. Doors of raised pataka, no localities recorded. 21. Musée d'Histoire Naturelle, Rouen 85, Photo: D.R. Simmons. 22. Hunterian Museum, Glasgow E333/1. Photo: Hunterian Museum.

TRIBAL STYLES OF RUA TAHUHU ENTRANCES

While all belonging to a single discrete class of Maori artefact, these rua tahuhu entrances represent an impressive range of tribal carving styles. Admittedly, the reliability of these tribal style attributions vary widely from those with a documented locality to those which have only been assigned to a tribal style on comparative grounds. Nevertheless, the reasoning for these stylistic attributions has been discussed for each example.

Most numerous are those in the style of the Whanganui River or Te Ati Haunui a Paparangi tribes (E,I,J,L), followed by one each from southern Taranaki Ngati Ruanui/Nga Rauru (F), Ngati Apa (G), Ngati Haua (H), Waikato (K), Taranaki tribe (M), and general Taranaki region (N). In general terms, these are all basically contiguous tribal areas in the western region of the North Island, thereby defining a regional range for this type of rua tahuhu entrance.

To the north, the regional type extends into the Waikato (K), as might be expected by the documented extension of Taranaki serpentine figure types into this area. Inland from North Taranaki, the Putikituna carving (H) is especially important as the sole definite example of a Ngati Haua tribal carving style. At the same time, the Putikituna carving also documents the extreme eastern extension of a basic north Taranaki carving style, fundamentally different from the squared frontal Whanganui carving styles which are encountered just downstream along the Tangarakau River to its junction with the Whanganui River.

To the south, the presence of a Ngati Apa carving (G), alongside several Whanganui and one possible south Taranaki representative (F), all of the same class of artefact, provides a valuable opportunity for improving the definition of tribal carving styles in this contentious area. Ford (1979:437) and Day (1983:183) have both questioned the possibility of defining a south Taranaki Ngati Ruanui/Nga Rauru carving style in the absence of actual localised carvings from this area. However, this absence did not deter Simmons (1985:92-93) from establishing a south Taranaki carving style within which he included the rua tahuhu entrance (F). Then, on even shakier grounds and without realising the Ngati Apa origin of rua tahuhu entrance (G), Simmons (1985:92, 94) suggested that a Ngati Apa carving style might be closely related to his south Taranaki style. For future stylistic studies, these carvings are key markers for a comparative study of related tribal carving styles extending from south Taranaki through the lower Whanganui area to the Rangitikei district.

With its wide geographical and stylistic range, this regional type of rua tahuhu entrance extends across both sides of the major divide between the northern/western sinuous styles and the eastern/central square styles. There is often a time differential between these groups of carving styles, as evidenced by a concentration of earlier stone-tooled carvings in the northern/western styles and later metal-tooled carvings in the eastern central styles. This same time differential is apparent in the present assemblage of rua tahuhu entrances, with entrances F, H, K and M from the Taranaki area executed by stone tools and E, I and J from the Whanganui area executed by metal tools. Only G and L from the greater Whanganui area are carved by stone tools, thereby indicating the presence of this type of rua tahuhu entrance in the Whanganui area in pre-European times. As expected from the history of other types of architectural carvings, the northern/western rua tahuhu apparently was not translated into metal tool work, except perhaps for the early metal example of N. On the other hand, the central/eastern styles represented here by the Whanganui area rua tahuhu entrances made a successful transition into the metal tool era.

Another line of investigation might examine the regional distribution of the archaeological evidence for different types of storehouses. As Day has commented (pers. comm. 18

March 1996) the occurrence of rua tahuhu type pits on Taranaki iwi pa sites is rare, the main type being the bell-shaped rua. However, rua tahuhu type structures are common in Ngati Ruanui and Nga Rauru territories.

SYMBOLISM

Of the 13 carvings in this series, three are definitely intended to be male, another three are definitely female, and the other seven are indeterminate. Of the 13, only two are naturalistic figures and both of these are clearly male. The other 11 figures are stylised, either as wheku figures which are all from the Whanganui area or shown with rounded brow ridges which are concentrated in the northern Taranaki area but are also scattered right across the regional spread of this class of artefact. Throughout all of these figures, despite their wide stylistic range, there is a remarkable consistency of figural composition and stance. As a composition, there is always one main central figure with very limited development of subsidiary figures or surface decoration on the background slab. Only three Whanganui figures (B,I,J) have a subsidiary figure on the body of the main figure, upside down in two cases and manaia in the Kaweka drawing. In terms of stance, all of these figures stand full frontal, mostly with both hands placed symmetrically on the body, except for one case of a hand to the mouth (E) and another (M) with both hands on hips.

Only one (F) has an ancestor identification inscribed on it and that is probably a later addition. However, the range of male and female figures indicates that several different particular individuals, presumably ancestors, are represented by each of these carvings. Their frontal stance with protruding tongue suggests a defiant or guardian attitude, perhaps with some connotation of fertility suggested by the genitalia depicted on almost half of them.

By treating these carvings as the doorways of pataka, Simmons (1985:34, 35) has interpreted their symbolism within the parameters of his symbolic scheme for pataka. Hence, while acknowledging the difficulty of interpretation in these three cases, he sees carvings G, H and M which are all clearly female as depicting creation in terms of the parentless birth of Rangi and Papa in the void of Te Kore. Whether the presence of male figures on this same class of artefact renders this interpretation doubtful is a moot point. Quite possibly, there are different symbolisms intended on different examples of this same artefact class.

Nevertheless, despite some scepticism invited by the bold sweep of this particular interpretation by Simmons, his suggestion does raise the important question as to whether the symbolism of these rua tahuhu entrances is the same as the symbolism understood for the entrances to raised pataka storehouses. Gilfillan's field sketch (Fig. 2) along with much other general evidence shows that raised pataka storehouses and semi-subterranean storehouses often stood side by side in a village context, obviously serving quite different functions. Semi-subterranean storehouses were designed specifically for the seasonal storage of the kumara crop while pataka provided storage for a wide range of items including preserved foods, implements, fishing and hunting equipment, weapons and valuables.

As recorded by the Rev. Thomas Kendall and elucidated by Binney (1968; 1980; 1986), the large carved frontal figure over the doorway of a raised pataka drawn by Kendall represented the deified creator-ancestor Nukutawhiti in the first primal state of undistinguished matter, presiding over the threshold passage between two states of existence, from life before creation to life in this world. Other kuwaha figures on pataka in museum collections are known to represent creator-ancestors of similar status to Nukutawhiti such as Tamatekapua and Kahungunu. In fact, most pataka kuwaha figures are male, a few are of indeterminate gender and some feature a male and female in copulation. Very few pataka kuwaha figures

are female, one rare example being the female holding an infant on the kuwaha of Wi Tako Ngatata's pataka, Nukutewhatewha, now in the Dowse Art Museum in Lower Hutt. Another female is the central figure over the doorway of the Te Kaha pataka, now in Auckland Museum. Kendall described the smaller figures on each side of Nukutawhiti as "the dual rib" or the two creative principles of knowledge and life. The figure below Nukutawhiti is his son, while the two figures on either side of the doorway are the keepers or guardians of the door to the underworld. In Kendall's scheme of interpretation, the number of fingers and the placement of the hands is significant. The absence of three middle fingers on Nukutawhiti's hands signifies that he is a deity in the first state, while the three fingers on the hands of his son and the guardian figures indicate that they are beings who have achieved existence and form.

In almost all respects, the figurative composition on the rua tahuhu entrances described here stands in contrast to the composition on pataka kuwaha. On the rua tahuhu entrances, female figures occur in equal numbers to males, and there are no supplementary figures comparable to the dual ribs and the guardians of the pataka kuwaha. With their numbers of fingers ranging from three to five, with the Putikituna figure (H) displaying asymmetrical-sized hands, and with several (F,G,H) having different numbers of fingers on each hand, there is obviously a variety of messages being conveyed by these distinctions. Although only one figure is named, it seems a reasonable inference that the rua tahuhu figures represent various local tribal ancestors of more recent descent than the remote primal deified creator-ancestors of pataka kuwaha.

On the basis of different functions and different types of figures represented, a difference in symbolism between the carved entrance-ways of these two distinct types of storehouses, pataka and rua tahuhu, is to be expected, conveying different sets of values and meanings for the community that owned them. Furthermore, as Day and Simmons have suggested, the use of carved entrances on rua tahuhu might have been restricted to those belonging to an important individual or to mark especially important and tapu stores, such as those in which the seed kumara were stored before being planted out in special gardens set aside by the tohunga (Best 1925:58). An important ancestor guarding the door of such rua kumara would have marked them as especially tapu.

REGIONAL TYPES OF SEMI-SUBTERRANEAN STOREHOUSE ENTRANCES

Although originating from several different tribal areas, the series of rua tahuhu entrances described above clearly represent one major regional type of entrance construction for a semi-subterranean storehouse. This can be called the western or Whanganui/Taranaki regional type.

Another regional type would be exemplified by the East Coast rua tahuhu entrance described by Tuta Nihoniho of Ngati Porou, quoted above. This type is seen in a photograph of a semi-subterranean storehouse with a carved face on its perepere from Te Horo near East Cape (Fig. 23). The plain door or kopani of this store can be seen leaning in the entrance, fortuitously indicating the depth of the interior excavated floor, approximately 60 cm below the level of the surrounding ground. Several perepere carved with faces like this, usually in Ngati Porou style, are preserved in museum collections. Very similar underground storehouses but with plain perepere, are illustrated by Hamilton (1896:99) at Waiomatatini, by Best (1925:118a) at Waiapu, and by Trotter and McCulloch (1989:56) at Waipiro Bay. The Waiomatatini storehouse has vertical timber panels forming the front, reminiscent of the fronts on the Whanganui storehouses (A,B,C and D) but without the lashings. In the Waipiro

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Fig. 23. Semi-subterranean foodstore at Te Horo, near East Cape. Photo: Museum of New Zealand B.1052.

Bay photograph, Mokena Pahoe poses with his baskets of kumara, ready to be neatly stacked in the storehouse. These entrances illustrated from Te Horo, Waioamatatini and Waipiro Bay can be grouped as examples of the East Coast regional type. Similar storehouse entrances were also in use in the Tuhoe tribal area, judging from the remaining heavy storehouse lintel timbers with single frontal face in Tuhoe style found in museum collections, corresponding with the Te Horo example figured above.

A third regional type of semi-subterranean foodstore entrance is represented by the doorframes and door collected by Waite and Sparke from Omarumutu, near Opotiki in 1908 (Fig. 24), now preserved in Canterbury Museum (registration number E 108.38). Without knowing exactly what type of semi-subterranean storehouse this door came from, enough of the structure is present to show how the flat door panel with a high relief frontal figure was held in place by a horizontal beam passing through a slot in a raised flange on each door frame. This can be called the Eastern Bay of Plenty type of rua entrance. An ancient storehouse door, 74.5 cm high by 48 cm wide, in Auckland Museum (50973) which may have come from Foxton in Horowhenua (Fig.25) is possibly another example of this same type of door, although the tongue at the top edge indicates a slightly different form of insertion. A tunnel behind the body of the raised relief figure is designed to take a horizontal beam holding the door in place, comparable to the horizontal beam that must have passed across the Omarumutu door and through the flanges on each door jamb.

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Please contact Auckland Museum for more information.

Figs 24-25. Doors of kumara storage pits. 24. Omarumutu, Opotiki. Canterbury Museum E 108.38. Photo: Canterbury Museum 14805. 25. Possibly from Foxton, Horowhenua. Auckland Museum 50973. Photo: Auckland Museum.

Several correspondences in structure can be seen between the Eastern Bay of Plenty rua entrance and the door jambs of semi-subterranean kumara storehouses from North Auckland. Several of these, including two or possibly three matching pairs, have been recovered from swamps in the north. The two definite matching pairs are from a swamp at Takahue near Kaitaia, in Te Rarawa tribal territory. Now in Auckland Museum, one of these pairs is registered as 37398 and 37399, the other pair as 37396.1 and 37396.2 (Archey 1977:49). A single door jamb from Tautoro near Kaikohe, Auckland Museum number 45506, is probably a Ngapuhi carving (Simmons 1985:67). Another single door jamb from somewhere near Auckland, Whanganui Museum 51.751, is probably a Ngati Whatua carving (Archey 1977:49; Simmons 1985:69). Yet another single door jamb figure in Ngati Whatua or perhaps Ngati Wai style from which the surrounding panel has been cut away is in the Musée d'Histoire Naturelle at La Rochelle, France, registration number H1702 (Simmons 1985:37). Finally in this series is the single door jamb from Peria in Ngati Kahu or Te Rarawa tribal territory, now Auckland Museum 37397, which has only a vestigial figure indicated as a curved raised ridge on the flat panel, suggesting that the raised flanges on the Omarumutu door jambs may also be vestigial figures. Apart from the Peria door jamb, all of these other North Auckland jambs have a single figure on each, either male or female, carved in the local North

Auckland serpentine figure style. In all of these including the Peria jamb, a slotted recess to accept a horizontal beam or peg is cut, usually into the genital area of each figure, suggesting a symbolism of sexual union as the linking beam across the door was inserted into the slot.

Considerably larger than all of these others, at 245 cm and 237 cm high, the third possible pair of semi-subterranean storehouse door jambs are the two carvings from a swamp at Otakanini on the Kaipara Harbour, Auckland Museum 6206 and 6394 (Archev 1977:49; Simmons 1985: 54). Instead of the single figure of all the other jambs, each of these panels bears two figures carved in serpentine North Auckland style. Some doubt may be raised as to whether they form a matching pair when one considers their different heights, their different fittings at the top, their different styles and periods of carving, and the lack of correspondence between their figures's sizes and placement. However, these Otakanini carvings share most of the same features of lashing holes, slotted recesses into the body for horizontal beams or pegs, and wedge-shaped cut-outs at the top present in the other jambs, indicating fairly convincingly that they all belong to the same class of artefact. Traditionally, they are said to have been carved by Kawerau and Ngati Whatua tribal carvers for a house named Tutangimamae. While most of the traditional evidence and the published literature dealing with these Otakanini carvings has implied that they belonged to some unspecified type of large dwelling or meeting house, their inclusion here suggests that they should be considered as the door jambs for an extremely large semi-subterranean kumara storehouse, a point partially recognized by Archev (1977:49) and Mead (1986:36) who described them as pataka carvings.

By extrapolating from the structural attachment of the lintel beam above the Omarumutu doorway, some understanding can be gained of the function of the wedge-shaped cut-outs at the top of many of the North Auckland semi-subterranean storehouse door jambs. They are apparently designed to fit against matching protuberances on a flattish lintel across the top of the doorway. No trace has survived of one of these lintel beams in the north, nor has a northern rua door panel ever been identified, perhaps indicating that both of these elements were usually left plain and uncarved.

Although associated with several different tribal groups on stylistic grounds, all of these northern door jambs can be grouped together under the North Auckland type of semi-subterranean storehouse entrance, comprising the fourth regional type of storehouse entrance structure identified in this study.

CONCLUSION

The identification of this series of carvings as the entrances to semi-subterranean storehouses has clarified much that was previously obscure in the architectural construction of these storehouses. The analysis of their localities of origin and their tribal carving styles has provided further evidence for an understanding of stylistic relationships, especially needed in the south Taranaki to Rangitikei area. On this basis, a new regional type of artefact and four regional types of semi-subterranean storehouse have been defined.

Much analysis still remains to be done on all of these types of semi-subterranean storehouse entrance carvings, especially a full architectural analysis and comparison of the structural features. A fuller study of the regional extent of each of these regional types of semi-subterranean storehouse entrances, as evidenced by the regional distribution of their archaeological traces, might prove useful. Hopefully, this study has assembled and sorted out the basic evidence, perhaps pointing out the directions that further research might take. There is obviously still much to be learnt about the symbolism of these carvings and their stylistic analysis needs to be integrated into the wider regional context.

Acknowledgements. Although I have disagreed with some of David Simmons's interpretations, it is obvious that this study owes a debt to his surveys of Maori collections in overseas museums and his work on tribal carving styles. I thank him for this and for his comments on this paper. Kelvin Day has also provided helpful comments on this paper. Michelle Horwood arranged for tribal approval of this publication from tribal representatives in the South Taranaki/Whanganui area. Others who have assisted with information, access to museum collections and permissions are Moana Davey, Arapata Hakiwai and Ross O'Rourke (Museum of New Zealand, Wellington), Kelvin Day, Ron Lambert (Taranaki Museum), Eric Wagener (Wagener Museum, Houhora), Michelle Horwood (Whanganui Regional Museum), Celia Thompson (Sarjeant Gallery, Whanganui), John Sullivan, Joan McCracken (Alexander Turnbull Library, Wellington), Dr Howard Morphy (Pitt Rivers Museum, Oxford University), Dr Euan MacKie (Hunterian Museum, Glasgow), Dorota Starzecka (Museum of Mankind, British Museum, London), Natalie Guy and Krzysztof Pfeiffer, both of Auckland Museum, assisted with the tables and illustrations.

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NEW ZEALAND MAORI BARKCLOTH AND BARKCLOTH BEATERS

ROGER NEICH

Abstract. This study synthesizes all the available information on barkcloth manufacture and use among the Maori of New Zealand. Documentary and traditional Maori records of paper mulberry trees and barkcloth show that aute barkcloth was made or known in North Auckland, Auckland, Waikato, Hauraki, central Bay of Plenty and the East Coast. Other native trees, especially *Hoheria* species, are discussed as possible sources of barkcloth. *Broussonetia papyrifera*, paper mulberry, became extinct in New Zealand by the 1840s. Specimens of actual barkcloth found in New Zealand are restricted to Otago, completely removed from the documented areas of barkcloth manufacture. Fourteen Maori barkcloth beaters have been located in museum collections, all of which are fully described here for the first time. These beaters come from North Auckland, Auckland, Waikato, Bay of Plenty and Taranaki. Displaying a diversity of form, these New Zealand barkcloth beaters have a strong affinity with nineteenth century barkcloth beaters of Eastern Polynesia. However, detailed comparisons with archaic Polynesian barkcloth beaters from the Vaito'otia/Fa'ahia site on Huahine, which are published here for the first time, reveal significant differences. Actual and supposed traditional Maori use of barkcloth is reviewed, revealing that its use was probably more restricted than generally believed.

Among their many traditional skills, the early Polynesian settlers who reached the islands of New Zealand brought with them the knowledge and techniques for making barkcloth from the inner bark of various suitable trees. In the tropical Pacific, barkcloth was made most commonly from the inner bark of the paper mulberry (*Broussonetia papyrifera*), various figs (*Ficus* spp.) and the breadfruit (*Artocarpus altilis*), all members of the family Moraceae, using techniques that have been widely documented since first European contact (Kooijman 1972; Ragone 1991:214-216).

In New Zealand, the Maori descendants of these Polynesians made barkcloth, which they called aute, from the same paper mulberry tree which they also called aute, and perhaps from other local trees endemic to New Zealand, especially the lacebark (*Hoheria*). The tropical breadfruit tree and the fig never became established in New Zealand but botanists agree that the paper mulberry was introduced into New Zealand from the tropical Pacific by these early Polynesian settlers (Green 1975:111; Merrill 1954:343; Whistler 1991:55). New Zealand Maori also retains the word "hiako" now meaning "skin, hide, bark, rind" (Williams 1971:48), presumably cognate with "siapo" in Samoan and "hiapo" in Niuean, both referring to actual barkcloth.

Colenso (1880:18) gave a succinct summary of current knowledge about paper mulberry and barkcloth in New Zealand that has not been improved on very much since his time of writing:

"I will first mention the Aute = Paper-mulberry (*Broussonetia papyrifera*) although, as far as I know, not a single vestige of this plant is now left in New Zealand! its name remains and that is all. Few Maoris now living have ever seen it; and yet, in ancient days, it was commonly and largely cultivated throughout the country. At the time of Cook's visit it was very common, and seen by those early voyagers everywhere, both growing in their plantations and worn in fillets by the chiefs in their hair; the thin white bleached paper-like bark contrasting excellently well with their ebon

locks! Very many of the heads of Maoris, in the plates of both Cook's Voyages and Parkinson's Journal, are drawn thus ornamented with the aute. Yet though commonly cultivated, it was of small size, and never was used by the Maoris for clothing purposes, as it was by many of the other Polynesians. The chiefs also made ornamental paper kites of it, which was one of their great diversions in time of peace, especially among the older men."

Presumably, the techniques of barkcloth manufacture followed in New Zealand were very similar to those employed in tropical Polynesia. If wooden beating anvils were used in New Zealand, they have not survived or at least have not been recognised in the archaeological record. Therefore, apart from the pieces of reputed Maori barkcloth that have survived, the only material evidence of barkcloth manufacture in New Zealand is the few barkcloth beaters that have been preserved in museum collections.

Two of these barkcloth beaters, both from Whangarei and at that time the only known examples, were reported in the literature many years ago by Buck (1924:34-38) with a very detailed analysis of their implications for barkcloth manufacture in New Zealand. Another beater, from Taranaki, was reported very briefly by Day (1984:16) without any analysis. Further beaters were known in a few museum collections but these have never been published previously except for a brief report by Wallace (1989:226) detailing the botanical identification of the wood used in the Taranaki beater and in five other barkcloth beaters in the Auckland Museum. Subsequent inspection by the present writer of Maori wooden beater collections in the Auckland Museum and other museums around the country has led to the identification of more Maori barkcloth beaters.

Although there are several other marginal examples, the total number of known definite Maori barkcloth beaters can now be increased to 14, indicating that they are a much more significant item of Maori material culture than previously realised, even by recent writers such as Davidson (1984:92, 104). Writing sixty years previously and before he knew of the Whangarei barkcloth beaters, Skinner (1920:52) had suggested that, because of the scarcity of *Broussonetia papyrifera* in New Zealand, the tapa beater which had been of such importance in the social life of Polynesia would have fallen out of practical use in New Zealand. He even argued that perhaps the Maori baton called a patuki with its surface decoration and apparently ceremonial function might be the New Zealand descendant of the Polynesian tapa beater. But in fact, patuki and barkcloth beaters are totally different in conception and appearance, and as the evidence now assembled here demonstrates, barkcloth beaters did not fall out of practical use in New Zealand.

Indications from the archaeological context of the New Zealand barkcloth beaters suggest that their form has remained basically similar through a long history of Maori barkcloth manufacture. Judging by the similarity of these Maori beaters to the beaters used by tropical Polynesians into the 19th and 20th centuries, the techniques of barkcloth manufacture in New Zealand probably also remained very stable throughout this period and closely resembled the techniques reported in Polynesia in historic times. The persistence of these wooden barkcloth beater techniques in New Zealand can also be regarded as oblique evidence for the antiquity of wooden barkcloth beaters in tropical Polynesia, given that these techniques must have been introduced to New Zealand from tropical Polynesia many hundreds of years ago. This evidence supplements that provided by the only occurrence of wooden barkcloth beaters in the tropical Polynesian archaeological record, those from the Vaito'otia/Fa'ahia site on Huahine in French Polynesia. A detailed comparison will be made below between the New Zealand and Huahine barkcloth beaters.

THE PAPER MULBERRY TREE IN NEW ZEALAND

Merrill (1954:343) and later botanical writers have accepted that *Broussonetia papyrifera* was spread through the Pacific from South-east Asia by the hand of man. Being highly prized for the manufacture of barkcloth, this tree has been one of the most carefully cultivated species in Polynesia. It does not set seed in Polynesia but is propagated vegetatively (Whistler 1991:55). A New Zealand botanist, Sykes (1969) reported that paper mulberry is not a tropical plant but is really a warm temperate species that dies out in hotter climates unless cultivated, a sign that it is not completely adapted to the tropics. Sykes further noted (Letter, W.R. Sykes to A.E. Wright, 3 July 1985, Auckland Museum files) that the species is primarily deciduous, as in the regions of Taiwan and Japan where it is indigenous and therefore it is not surprising that it is deciduous in temperate New Zealand. Sykes believed that it only retains its leaves in places such as Tonga and Fiji because of the effect of a tropical climate on what is really a warm temperate plant.

Most recently, Matthews (in press) has reviewed the botanical history of *Broussonetia papyrifera* and the evidence of its spread beyond its natural range in China, Korea, Japan and mainland South-east Asia. He does not provide a map of the plant's geographical range in New Zealand but he does suggest possible reasons for its extinction here.

In New Zealand Maori language, the paper mulberry is known as *aute*, cognate with *aute* in the Cook Islands and the Society Islands, with *ute* in the Marquesas and *wauke* in Hawaii. According to New Zealand Maori traditions, *aute* was brought to New Zealand on the Oturereao, the Tainui, and the Aotea ancestral migration canoes (Andersen 1907:322; Buck 1950:63; Hammond 1924:120; Orbell 1985:115; White 1888:8). Marama arrived with her *aute* tree on the Tainui but because of her indiscretion in having an affair with a slave, her *aute* was transformed into the *whau* which is useless for making cloth (Andersen 1907:11; Orbell 1985:116). The ancestress Whakaotirangi is credited with planting the first *aute* in the new land of Aotearoa (White 1888:8).

Within New Zealand, paper mulberry is usually considered to have been restricted to the North Auckland peninsula down to the Waikato district, Coromandel, Bay of Plenty and perhaps around the East Cape to northern Hawkes Bay. Palmer (1989:18) commented that the tree is hardy throughout lowland New Zealand but he is presumably referring to those planted since the recent re-introduction of the species from Japan (Sykes 1969). Nevertheless, this does suggest that climate is not a primary limiting factor for the geographical range of paper mulberry in New Zealand. An examination of the geographical evidence for cultivation of paper mulberry in pre-European and early post-contact times may allow this distribution to be documented more accurately. Records of paper mulberry trees, barkcloth use and other associations with a geographical reference are plotted on the map (Fig.1) according to the alphabetical key for each entry.

DOCUMENTARY RECORDS OF PAPER MULBERRY TREES AND BARKCLOTH

A. Captain James Cook noted in his journal for 22 October 1769 that the people at Anaura Bay were at first very keen to trade for the Tahitian tapa cloth that Cook's men had brought with them but soon lost interest in the island tapa (Beaglehole 1955:182). Beaglehole believed that this loss of interest resulted from Maori realisation that the island cloth was the same as their own Maori barkcloth, although available in unprecedented quantity from Cook's men.



Fig. 1. Map of the North Island of New Zealand showing localities referred to in the text, indicated by the letter or Roman numeral heading each entry. A-J, Documentary records of paper mulberry trees and barkcloth; K-T, Traditional records of paper mulberry trees and barkcloth; I-XIV, New Zealand barkcloth beaters.

B. Monkhouse with Cook at Anaura was uncertain whether the “cloth plant” was cultivated there but he must have seen something to cause him to make this observation (Beaglehole 1955:584). Monkhouse’s comment is ambiguous but Salmond (1991:227) takes it to infer that aute was growing wild at Anaura and Uawa.

C. Cook at the Bay of Islands in December 1769 recorded that he saw about half a dozen cloth plants “being the same as the inhabitants of the islands lying within the tropics make their finest cloth of” (Beaglehole 1955:218). He went on to comment that the plant must be very scarce as the barkcloth made from them was only used as ear ornaments in small pieces.

D. Joseph Banks at the Bay of Islands with Cook explained explicitly how the Maori valuation of barkcloth changed:

“Our Island cloth which used to be so much esteemed has now entirely lost its value: they have for some days told us that they have of it ashore and shewd us small pieces in their ears which they said was of their own manufacture, this at once accounts for their having been once so fond of it and now setting so little value upon it.”

(Beaglehole 1962 I:442)

Banks saw the same small plantation of paper mulberry trees described by Cook, confirming that the six plants were definitely paper mulberry, which the Maori used to make ear ornaments (Beaglehole 1962 I:444).

E. Sydney Parkinson at the Bay of Islands with Cook commented that: “We saw many plantations of the Koomarra, and some of the Eaowte, or cloth trees” (Parkinson 1784:110).

F. Colenso (1880:18) reported that he saw paper mulberry growing in the Bay of Islands only once, in an old plantation at the head of the Kawakawa River in 1835. Even this was only one small tree about six feet high and so unhealthy that it died soon after.

G. In 1844, Colenso (1880:18) was told of some aute trees still growing at Hokianga.

H. Gilbert Mair noted sometime in the 1880s that “Aute or Tappa was grown by Te Pahipoto at Puketapu Pa and also at Okataina” (G. Mair, Notebook 29, p. 36. Alexander Turnbull Library). “Puketapu Pa” probably refers to the pa at Te Teko, famous as the home of Te Ramaapakura, a chief of Ngati Awa. Te Teko is the headquarters of the Ngati Pahipoto hapu of Ngati Awa. “Okataina” is a reference to Lake Okataina in the Rotorua district, the territory of the Ngati Tarawhai tribe of Te Arawa.

I. Best (1925:73) records that the paper mulberry was cultivated in the Waiapu district of East Cape.

J. At a Maori Land Court hearing on March 3, 1900, for a block of land at Lake Rotoiti, Tieri Te Tikao mentioned in his evidence:

“I now recollect that at Kauaeapuapu is growing a “ka” [bamboo or cane]. Another thing they planted there is an “aute” but I am not sure whether it is still growing - I saw it there when I was young. I then lived at that pa. It was in my time that we moved to Pukearuhe. I was nearly adult. I went to join the Hauhaus. I am not quite sure whether the “aute” was growing at Kauaeapuapu or at Ngamokai-a-Tinirau. There was only a fence between the kaingas. It is a very long time ago - I have not been there in recent years.”

(Maketu Land Court Minute Book 21:178)

The localities described by Tieri Te Tikao are near Lake Rotoiti in the Rotorua district and judging from his comments, the time when the aute was growing must have been about 1840 or 1850.

TRADITIONAL RECORDS OF PAPER MULBERRY TREES AND BARKCLOTH

Placenames and proverbs relating to paper mulberry trees and barkcloth with a geographical reference can also be regarded as possible indicators of the geographic range of paper mulberry, of course with varying degrees of reliability.

K. According to Buck (1950:161) the place name of Te Aute in Hawkes Bay is said to commemorate an unsuccessful attempt to grow the plant in that locality. Earlier however, Buck (1924:34) had commented that this name had been transferred from its original locality at some unspecified place. Other sources (Alexander 1951: 35; Friends of Te Aute College 1973) consider the name to be derived from the tradition that aute trees once grew on the hills behind the college and gave their name to the original Maori village at that locality. Both these sources quote the earliest known reference to Te Aute, from Donald McLean's journal entry for 16 December 1850: "In the evening we crossed to Te Aute, a beautiful clean settlement with a fine clump of forest and beautiful grazing land around it". The endpaper map in Woods (1981) biography of the Rev. Samuel Williams, founder of Te Aute College, pinpoints the "site of original Aute tree" but gives no explanation. One can only conclude that the traditions surrounding the reason for the name of this locality have become confused.

L. Aute occurs as a place name on the Manukau Harbour, opposite Puponga Point or Cornwallis (Andersen 1942:388).

M. Te Aute is the name of a bay in the Opito block, Coromandel district (Andersen 1942:388).

N. A Maori proverb stating "Haere mai ki Hauraki, te aute te awhea" which Colenso (1879:145) translated as "Come hither to Hauraki, where the prepared paper mulberry bark is not blown away by the winds while drying and bleaching" can be regarded as evidence for paper mulberry growing and barkcloth manufacture in the Hauraki district. Buck (1924:32) has given other versions of this proverb which convey the same meaning.

O. Percy Smith has recorded a tribal saying of Ngati Whatua of Otakanini pa in southern Kaipara, as "Te aute te whawhea" which he translates as "girded with aute" (Brigham 1911:18; Smith 1895:43), suggesting that the plant and its cloth were well known in that district.

The phrase "te aute te whawhea" or "te aute te awhea" occurs in several versions of the proverbs noted here in sections N and O. Buck (1924:32) has questioned Smith's interpretation of girding on the aute cloth, instead supporting Colenso's understanding of a place where the aute tree or the treated aute barkcloth is not disturbed, either by winds or the passing of a war party. Certainly, in the most recent recording of a series of Ngati Whatua proverbs about the chiefs of Otakanini which contain this phrase (McRae 1987:41, 51, 62) it is the idea of the aute not being disturbed which is accepted. However, comment is also made that "the saying about the aute refers to the fact that the chiefs of the Otakanini pa in the Kaipara were of rank sufficient to constantly wear garments made from that very rare bark of the paper mulberry

tree” (McRae 1987:51). Obviously, regardless of detail, aute trees and cloth made from them were a prominent component of the cultural assemblage in the southern Kaipara, a fact supported by the finding of barkcloth beaters in the area.

P. A tribal saying attributed to the chief Pokere of Hauraki likens his successor Hauauru of Hauraki to an aute tree growing in his home district (Buck 1924:33; Graham 1903). As Whareterara Hapi explained the proverb to Graham, the aute tree was figurative of an heir, being a thing of value. Such trees were planted about the pa and in the wars of olden times the aute plantations were invariably destroyed by the attacking forces.

Q. Aute occurs in the name of Te Potae Aute (the aute hat), a prominent chief of Ngati Porou at Tokomaru Bay (Buck 1924:34). Grace (1959:327) tells of a chief named Te Potaeaute from Poverty Bay who was instrumental in raising an intertribal force to attack Te Wera Hauraki at Mahia.

R. Buck (1924:34) records Ngati Aute as the name of a sub-tribe in Hauraki. This is presumably the same as the hapu of Ngati Maru known in the 1920s as Ngati Manuaute, and more recently as Ngati Te Aute. According to Graham, the name Ngati Manuaute refers to the kite flown at the place now called Manurewa by Tamapahore who later moved to live with his mother’s people at Piako where his descendants became known as Ngati Manuaute (Maysmor 1990:61). A Ngati Maru ancestor named Te Aute appears on whakapapa five generations below Marutuahu. An authoritative modern Ngati Maru source (Watene 1978:4, 35, 88, 90) attributes the hapu name Ngati Te Aute to the marriage of Poutangi, one of the main descendants of Tamatepo, first son of Marutuahu, to Te Aute a chieftainess of Te Arawa from Rotorua. In other Ngati Maru whakapapa however, Te Aute is shown as a direct descendant of Taurakapakapa, a son of Marutuahu.

S. In a Ngati Porou lament composed in early European times by a man of the Waiapu district, reference is made to “he kiri aute” which A.T. Ngata translated as “a cloth of the aute” as opposed to a European blanket (Ngata 1928:113).

T. In a traditional account written in North Auckland before 1856 and recorded by John White (Simmons 1976:361), the ancestor Kahungunu decorated his topknot and his ear with aute cloth. This cloth was described as having been stripped from the tree and then beaten with a beater called a paoi, but the strips were only as wide as a child’s finger.

THE EXTINCTION OF PAPER MULBERRY IN NEW ZEALAND

In view of the temperate climate origin of *Broussonetia papyrifera*, the reasons for the later demise of paper mulberry in New Zealand are clearly more complex than the usual simple explanation of climatic unsuitability.

Matthews (in press) has suggested several possible factors which might have contributed to the plant’s decline in New Zealand. These are (i) a decline in cultivation, (ii) destruction by newly introduced herbivores, especially cattle, (iii) an inability to breed and disperse by seed, due to the introduction of only one sex, or geographically segregated introductions of both sexes [*Broussonetia papyrifera* being dioecious], (iv) loss of flowering ability, because of mutations accumulated over a long period of vegetative propagation and cultivation, (v) previous adaptation to tropical conditions, leading to weak vegetative growth in the temperate

climate of New Zealand, and (vi) an accumulation of pathogens or harmful mutations, leading to weak vegetative growth.

Colenso (1880:18) cited an 1844 report from E. M. Patuone stating that the paper mulberry plants at Hokianga had been almost totally destroyed by the grazing of cattle. Matthews (in press) reported that paper mulberry was actually used as cattle fodder in Taiwan. The effect of introduced pigs in New Zealand also needs to be considered. Sometime about the turn of the century, Tutakangahau of Tuhoe told Best that the aute plant had become lost to his tribe in the time of his grandparents (Best 1925:73). This Tuhoe region would have been far distant from the possible ravages of cattle but well within the range of recently-introduced pigs.

From an anthropological point of view, more emphasis may need to be accorded to the suggestion of a decline in cultivation resulting from a deliberate Maori choice of whether to propagate or not, a decision in which changing fashions of dress and ornament were probably the prime movers. From Colenso's evidence, the paper mulberry tree must have become extinct in New Zealand sometime soon after the 1840s. Healthy *Broussonetia papyrifera* growing around Auckland and other places today are the result of recent imports of new stock from Japan and China.

OTHER TREES USED FOR BARKCLOTH IN NEW ZEALAND

Within New Zealand, the barks of other native trees were used for making cordage and perhaps for making barkcloth. The lowland ribbonwood (*Plagianthus regius*) known to the Maori as manatu, houī, whauwhi and puruhi has an inner ribbonlike bark that was used by the Maori for making rope and twine for fishing nets and perhaps for other purposes (Laing and Blackwell 1964:270). The mountain ribbonwood (*Hoheria glabrata* or *Hoheria lyallii*) known to the Maori as houhi, houhere, hoihere, houii and whauwhi has an inner bark with the same lace-like appearance as that of the other hoherias (Laing and Blackwell 1964:268). Beattie (1994:47) has described a South Island type of cloak called a kakahu-houī made of ribbonwood bark (kiri houī) but this was only attested traditionally and no informant had ever seen one. As reported by Beattie, this ribbonwood bark could be scraped, dried and beaten into a material suitable for making clothing, baskets, poi balls, hair ribbons, belts, piupiu and hats.

The sand daphne (*Pimelea arenaria*), known to the Maori as autetaranga or autetauranga, belongs in the same family (Thymelaceae) as the lokta of Nepal and the mitsumata and gampi of Japan, all used in papermaking. Williams (1971:23) notes that an inferior kind of cloth was made from autetaranga bark. According to Riley (1994:336) the inner bark of autetaranga was made into white cloth-like strips by a simple process involving chewing. These strips were then used as ribbons to fasten up the hair, threaded into the belts of chiefs and also worn as ear ornaments. Recent retting and beating trials by Graveson (1996), an experienced papermaker, on autetaranga inner bark indicate that it is possible with some difficulty to produce a tapa-like cloth from this tree.

By far the most common native trees said to have been used for barkcloth were the lacebark (*Hoheria populnea*) known to the Maori as houhere, hohere, houhi, houii, houhi ongaonga, whauwhi, wheuhi, and ongaonga, and the narrow-leaved lacebark (*Hoheria angustifolia*) known to the Maori as houhi, puruhi, houhi-puruhi and hungere (Beever 1987).

It is commonly believed that the inner bark of the lacebark tree was used for cloth-making in both an unbeaten and a beaten state. However, there is some informal experimental evidence that indicates difficulties in producing spread and felted lacebark cloth, although its manufacture was replicated experimentally (D. Bonica and M. Pendergrast, pers. comm. 1994; Graveson 1996). All of the descriptions of definite lacebark use in artefacts refer to

unbeaten bark. Best (1942:129) mentions “ropes made by twisting or plaiting the tough pliant bark of the houhi (*Hoheria populnea*)” and goes on to tell of old Maori accounts about how “in times long past, their ancestors endeavoured to make felted barkcloth from this material by the beating process which produced the tapa of Polynesia”, thereby implying that these Maori informants were aware of the unsuitability of lacebark for this process. Phillipps (1966:146-147) has described some of the hats, kits and headbands made in various parts of the country from unbeaten lacebark during the later 19th century. Riley (1994:148) notes several usages of the inner bark of lacebark, for medicines and cordage, none of which involve beating of the material.

Virtually nothing has been recorded about the process of making barkcloth by beating the inner bark of the lacebark, despite the frequent assumption that many of the barkcloth pieces found in the South Island are said to be made from *Hoheria* bark. Skinner apparently believed that he could distinguish *Hoheria* barkcloth on the basis of texture, describing a piece from a cave on the Upper Taieri River as of “extremely poor texture” like “coarse muslin” with “many large holes and the felting is everywhere poor (Buck 1924:39). Rowley (1966) tried to distinguish barkcloth made of *Hoheria* from barkcloth made of paper mulberry on the basis of differing cell width. She found that the fibres from paper mulberry appeared to be wider than those of *Hoheria* but admitted that further statistical studies were necessary for these results to be conclusive.

At the request of the present writer, an attempt was made by Dr Rhys Gardner, Auckland Museum Research Associate in Botany, to distinguish barkcloth made from the inner bark of *Plagianthus*, *Hoheria* and *Broussonetia* in a controlled experiment. Gardner found that samples of raw, unbeaten inner bark from these three trees could be readily distinguished microscopically on the basis of anatomical features. However, on examining named beaten samples of each type of bark supplied by Bonica and Pendergrast, Gardner found that the beating had totally destroyed these distinctive structural features, making it impossible to distinguish the sources of these barkcloths. Gardner believes that only chemical analysis of the material will provide a technique to definitely distinguish these fibre sources (Gardner, pers. comm. 9 February 1995).

No beaters specifically documented as lacebark beaters have been preserved in any museum collections. The only known reference to a lacebark beater is supplied by Hamilton (1896:273):

“This lacebark (hoihere) is used in thin bands as a head-dress; and the Rev. T.G. Hammond informs me that he has seen at Hokianga a carved bone patu used to give a fancy pattern to these bands”.

Buck (1924:39) commented that this usage of a beater designed to produce a patterned texture suggested an echo of the old Polynesian technique of barkcloth beating but he pointed out that the use of a bone barkcloth beater would be unique in all of Polynesia. Furthermore, Hammond’s account does not necessarily mean that the lacebark was actually spread or felted in this pattern-beating process.

In the absence of any evidence to the contrary, it would seem that the wooden barkcloth beaters to be described in this study are designed for use with paper mulberry bark. This assumption is supported by the differential geographic distribution which emerges of all the barkcloth beaters being localised to the north of the North Island and all the putative *Hoheria* barkcloth finds being localised to the south of the South Island. Another as yet unconsidered possibility is that some New Zealand barkcloth was made using a combination of raw inner barks from both the lacebark and the paper mulberry. A comparable combination has been reported from Tahiti and the Marquesas where some barkcloth was made from a mixture of raw inner bark of paper mulberry and *Ficus* or *Artocarpus* (Kooijman 1972:10, 182).

EXTANT SPECIMENS OF NEW ZEALAND BARKCLOTH

If the men travelling with Cook in New Zealand ever collected any local barkcloth, none of it has survived into the Cook voyage collections described by Kaeppler (1978). Nor do any of the New Zealand artefacts in these Cook collections incorporate any local barkcloth in their construction. However, in his recent book *Oceanic Art*, Thomas (1995:133) has illustrated a page reputedly from a copy of Alexander Shaw's *Catalogue of the different specimens of cloth collected in the three voyages of Captain Cook to the southern hemisphere, 1787* which shows a coloured and patterned piece of actual barkcloth labelled as "Bark cloth curiously formed in angular figures shewing the taste of the natives of New Zealand". This illustration is credited to the Mitchell Library at the State Library of New South Wales in Sydney but personal inspection of the three Alexander Shaw catalogues in the Mitchell Library has confirmed that this page does not exist in any of them. Nor does it exist in the Shaw tapa catalogue held in the Auckland Museum library. Thomas himself is unable to locate the source of this illustration. If this Shaw sample does exist and is genuinely from New Zealand, then it would be the only surviving piece of coloured and patterned Maori barkcloth. However, in view of the notorious confusion of Pacific localities on early labels and all the other documented evidence of Cook period New Zealand barkcloth as being white and limited to very small pieces, the chances of this piece being genuine New Zealand barkcloth are very slight indeed.

Brigham of the B.P. Bishop Museum in Honolulu claimed (1911:71, 244) that he had a specimen of New Zealand Maori-made barkcloth which he described as "white, thin and fairly well beaten, quite suited to the use our authorities tell us it served". Using Hawaiian-derived terms, Brigham further recorded it as "A white, mole, waoke kapā from New Zealand. C.F. Williams, 1850. Given by P.A.A. (E.3149). Very Rare".

In response to my enquiry, Dr Roger Rose, Curator of the Department of Anthropology at the Bishop Museum, has written:

"The barkcloth (Brigham, p. 244): This is a small sample (24 x 15.5 cm) exchanged to Bishop Museum in 1896 from the Peabody Academy of Science (P.A.S.) by Prof. Edward Morse, their Director of the time. The E.3149 number is the Peabody's number (ours is 1896. 08. 33), and C.F. Williams was the original donor, apparently in 1850. The Peabody had it catalogued as "said to be" from New Zealand, which Brigham followed. (It was not separately catalogued in the Bishop Museum collection until 1979, and as Hawaiian.) It is probably paper mulberry, very thin, creamy white, plain, and no apparent watermark. Kenneth Emory noted on the sheet to which it is attached in 1959 "probably Hawaiian", and I added later, "Indistinguishable from Hawaiian RGR 5/79." Peter Fetchko of the Peabody Museum wrote 20 June 1979 in answer to my letter that there was no further information in their files. We have no other barkcloth catalogued as coming from New Zealand".

(R. Rose, pers. comm. 11 May 1993)

Therefore, thanks to Rose's information, the status of this reputed specimen of Maori barkcloth has now been clarified and consequently it can be disregarded in this study.

Several finds of barkcloth have been recorded in New Zealand but strangely all the localised specimens have come from a very restricted area of Otago centred on the upper Taieri River. This restricted distribution may simply be a reflection of the suitability of the dry inland Otago climate for preserving textiles, but perhaps other factors are at work, such as a very localised manufactory. These finds have been complicated by inadequate and confused reporting in the literature, inadequate museum registration, doubts about the distinction between barkcloth made from paper mulberry as opposed to barkcloth made from lacebark, and the possibility that some of these finds are actually Pacific island barkcloth imported into

New Zealand at some early date. In the following entries, an attempt has been made to correlate the published records of New Zealand barkcloth finds with the actual specimens now held in museum collections:

U. Augustus Hamilton (1896:176) reported on the find in August 1894 by a Mr Mathewson (spelt wrongly by Hamilton, actually Mr R. A. Mathewson, later a member of the Dunedin Stock Exchange) of several fibre and textile items in a rock shelter about four and a half miles from Hyde on the upper Taieri River. Included among these were “a piece of very soft white tappa-cloth, 6 ft long and 18 in. wide at one end, tapering to a point; also an irregular strand of lace-bark, about 5 ft. long”.

All of the fibre and textile items from this find, including the “soft white tappa-cloth” but apparently not the “irregular strand of lacebark”, were eventually presented by Mr Mathewson to the Dominion Museum in Wellington where they were registered under numbers G1427 to G1433. By some unknown transaction all of these items are now in the Auckland Museum (AIM 51086, 51087, 51088, 54563, 54564) where they were incorrectly associated with the Sir George Grey collection. The soft white tapa cloth is registered as AIM 54565.

Hamilton himself considered that these articles had probably been made by Samoans, presumably in Samoa. He surmised that they were probably brought to New Zealand by a Maori who had served on an early whaling ship. Certainly, all the woven articles in this find would seem to be from tropical Polynesia even if not necessarily from Samoa. The mats could just as easily be from Wallis/Futuna or other Polynesian islands.

The present location of the piece of presumed lacebark cloth from this find is now uncertain. As one might expect from the presence of the other items from the same find, it could now be in Auckland Museum. Indeed, Auckland Museum does hold two pieces of white barkcloth (AIM 51085) which were thought to be associated with the Mathewson collection, but there is no evidence for this connection. The fact that the lacebark piece was not apparently presented or registered into the Dominion Museum collection in 1920 seems to indicate that it did not pass on to Auckland Museum with the other items. Other evidence assembled below indicates that this piece of lacebark remained in Otago Museum.

Skinner (in Buck 1924:39) described the piece of lacebark found by Mathewson, then apparently in the Otago University Museum, as being about 55 inches long and 27 inches wide, of a creamy brown colour and the texture of coarse muslin, with many large holes and poor felting. Both Skinner and Buck considered that it was made from lacebark (*Hoheria populnea*) and it is interesting that Skinner obviously believed it had been felted by beating.

Recent investigations by staff and the present author at Otago Museum suggest that this is probably the piece now registered as D34.617. Certainly the dimensions are a close match with D34.617, measuring approximately 136 cm long by between 55 cm and 63 cm wide. This is recorded as presented by George Fenwick and was registered as “old stock” in 1934. On David Teviotdale’s information, it is said to have been found in a cave in the Upper Taieri by a Mr Matheson (Moir White, Otago Museum, pers. comm. 27 August 1993).

From my own examination, D34.617 is brown in colour and has a very coarse uneven open texture consisting of diagonal crossing fibres, with many holes. It appears to be loosely felted but is totally different from *Broussonetia* tapa cloth. Insofar as the appearance of lacebark barkcloth is understood, this could well be made from lacebark. Skinner’s original museum display label for D34.617 said that it was made from a ribbonwood tree. In a 1986 Otago Museum special exhibition of Polynesian weaving and plaiting entitled “Patterns of Change”, this piece of cloth was said to be “made from southern ribbonwood bark, probably mid 1800s”.

Skinner (1952:132) later refers to “a large coarse piece in good condition ... found by Matheson in a rock-shelter near Middelmarsh”, which, allowing for a slight error in the spelling of the finder’s name is probably the same original Mathewson piece, registered in the interim as D34.617. According to Skinner, part of this same cloth is in the Dominion Museum but recent enquiries at the Museum of New Zealand, Wellington, have not been able to locate any sign of it there.

V. Piece of barkcloth in Otago Museum (D 67.2809). This has been in the museum collection with no recorded information other than a note stating “found in Otago” from prior to 1967 when it was registered (Moir White, Otago Museum, pers. comm. 4 September 1993). It measures about 42 cm by 17 cm. Of white colour, it consists of a very soft and thin single layer which is not felted and has many holes. With a fairly close texture, it appears to be like paper mulberry tapa cloth.

W. In describing a 1951 find by W.J. Kidd of a Maori “medicine bundle” wrapped in dogskins from a hole in a rock in the Lammermoor Range seven miles from Middelmarsh, Skinner (1952:131) mentions that on the floor of the niche were later found “some small perished pieces of tapa cloth, the texture of which suggests that they were locally made from the inner bark of houhi (lacebark)”. Although the bundle was presented to Otago Museum, these small pieces of barkcloth found later cannot be located in the collection and were probably never presented.

X. In a note attached to an article by Rowley (1966:108), David Simmons, at that time the curator of anthropology at Otago Museum, mentions a “large roll of hoheria tapa...a single piece of tapa some 12 feet long by 3 feet wide” found in the Middelmarsh area. This is possibly the same “length of thin bark cloth about nine feet in length, found in a cave in Central Otago” mentioned by Hamilton (1896a:293) which he at first thought was of Pacific island origin but later considered to be “of Maori manufacture and made from the hohera”. This roll of barkcloth has not been specifically identified subsequently in the Otago Museum collections (Moir White, Otago Museum, pers. comms. 30 August 1993, 15 February 1996, 20 February 1996). It may in fact be the same piece as D34.617 described above under U, simply with the dimensions enlarged.

Y. By far the most spectacular, and happily the best documented find of barkcloth in New Zealand, is the wooden box containing 70 huia feathers, some bunches of red kaka feathers, a wooden awl, some cordage, and various pieces of barkcloth, found in central Otago in 1933 (Otago Museum Annual Report 1934; Phillipps 1963:41; Rowley 1966:108; Skinner 1952:132). The original Otago Museum label for this assemblage, presumably written by H.D. Skinner, reads as follows:

“Box, waka huia, containing 70 huia feathers and 20 bunches of scarlet kaka feathers found in a rock cleft north of the confluence of the Talla Burn and the Clutha River, and east of the Clutha. The box is roughly cut with stone tools and is uncarved. It was wrapped in Otago tapa cloth, made from the inner bark of lacebark (hohera) round which, as an outer wrapping, was a piece of finely plaited mat. The wrappings were securely tied with flax two-ply string. In the box was a wooden awl, the head of which had an inner pad of white tapa and an outer covering of brown tapa. As the huia lived only in the North Island, the feathers must have come to Otago by barter or gift. It seems unlikely that the box was hidden later than about 1820. It represents the most spectacular single find of Maori material ever made in Otago. A single huia should provide 12 feathers. A bunch of scarlet feathers would be attached to the base of huia feathers worn by the Maori at the side of the

head. With the waka huia was found a flax kit (D 33.1893, A and B) and a piece of baleen (D 33.1894) shown in this case. Discovered and presented by Mr G. Rae, Miller's Flat, D33.1892."

Recently, Bill Dacker has reported on information supplied by Larry Paterson and John Shaw, both men who knew George Rae well, that this material was actually found above Craig Flat (Moir White, pers. comm. 22 February 1996) but this has not been verified.

Simmons (in Rowley 1966:108) has added that the outer covering was a very finely woven cloak with dogskin tags, not a mat as described by Skinner. However, there are now no traces of dogskin tags ever having been attached to this cloak (Moir White, pers. comm. 22 February 1996). In a photograph of this box with its wrappings published by Phillipps (1963:Plate XIII), the outer wrapping is clearly a portion of a thick woven cloak. Another photograph of the box without its outer wrapping is published here (Fig. 2) to show the shape of the box and the very thin, fine, open-textured piece of barkcloth lining the interior. Rowley (1966: 108) thought that this interior piece of barkcloth appeared to be made from *Hoheria* fibres, but from my examination it could just as well be paper mulberry. This lining piece is unnumbered and measures approximately 35 cm in length and at one point is about 8 cm wide.

The barkcloth wrapping from around the box is registered as D33.1892d and measures 130 cm by 24 cm. This is a very soft, creamy brown, single layered cloth with many branch holes. The texture is smooth and homogeneous with long-grained fibres crossing at a regular low angle. From general examination it could well be paper mulberry, an opinion agreed with by Rowley (1966:108).

One of the items inside the box was a wooden awl (D33.1892f), 15 cm in length and padded at the proximal end with two layers of barkcloth. This pad has white barkcloth underneath and a dark brown barkcloth strip wrapped around this.

In the following year, Mr George Rae presented Otago Museum with a group of additional barkcloth pieces found in the same shelter (D34.961a, b, and c). Because of the fragmentary and rigid nature of these pieces, accurate measurement is difficult. D34.961a in its folded state is approximately 21 cm long and appears to be folded upon itself twice, making the original at least 63 cm long but the whole lump is now rigid. D34.961b is very tattered but is at least 24 cm in one dimension. D34.961c is also very tattered but is at least 20 cm long and probably quite wide (Moir White, Otago Museum, pers. comm. 27 August 1993). These three fragments have a very similar texture and colour to the barkcloth D33.1892d, which was around the box.

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Please contact Auckland Museum for more information.

Fig. 2. Wooden wakahuia box containing huia feathers and barkcloth lining, found at the confluence of the Talla Burn and Clutha River, Central Otago. Photo: Otago Museum.

Reviewing all of these barkcloth finds from Otago, it has been generally assumed that the apparent *Hoheria* barkcloth was manufactured locally while the possible *Broussonetia* barkcloth was imported into Otago, either from the North Island of New Zealand or even from the Pacific islands. However, in the absence of reliable techniques for distinguishing barkcloth made from *Hoheria*, *Broussonetia* or other trees, there are far too many unresolved questions about these New Zealand barkcloth finds to allow any definite conclusions. These finds cannot add anything to knowledge about the geographical distribution of the trees involved. To the contrary, they indicate the strong possibility of long-distance transport of raw materials for particular purposes. Our further inability to distinguish plain barkcloth made of *Broussonetia* in New Zealand from cloth made of *Broussonetia* in the Pacific islands renders all questions of possible imports of finished cloth from the Pacific even more problematical.

NEW ZEALAND BARKCLOTH BEATERS

In central and eastern Polynesia, the most common word for a barkcloth beater is “*ike*” or its cognate “*i’e*”. In New Zealand Maori, the transitive verb “*ike*” and its compound “*paike*” mean to strike with a hammer or other heavy implement (Williams 1971:76). Among many Maori terms for beaters of various sorts, such as *kuru*, *patu*, *tuki*, *ngahiri*, *morenga*, *paoi*, *takaukau*, and *toi*, for actual barkcloth beaters, Williams (1971:255, 271) gives only “*pato*” and “*paku*” as nouns meaning “a maul or pestle for beating fernroot, aute, etc.” In the traditional account of Kahungunu’s use of aute cloth (T above), the beater used in its manufacture is called a *paoi*, but this is also a general term for any wooden beater. Despite their lack of specific reference, these are the only terms known to be applied to aute beaters in New Zealand. In his study “Introduction to Maori Pounding Implements” Phillipps (1939) did not come across any other terms for barkcloth beaters. Elsdon Best did use the term “*patu aute*” to describe a putative barkcloth beater in a manuscript artefact collection inventory but one suspects that he coined this term himself.

In order to identify barkcloth beaters in New Zealand Maori collections, a working set of criteria had to be established to distinguish barkcloth beaters from other similar wooden beaters such as fernroot beaters, carving mallets, and *patuki*. By extrapolation from Pacific island tapa beaters, these criteria were defined in order of importance as:

- (i) longitudinal parallel grooves on at least one facet of the beater,
- (ii) flat, reasonably parallel sides,
- (iii) usually a squared or rectangular cross-section, possibly with some rounding at the edges, and
- (iv) a reduced diameter handle marked off from the beating facets by a shoulder.

The criterion of longitudinal parallel grooves is the only essential one but the other criteria are usually present to some degree. Consequently, fernroot beaters are excluded by their lack of grooves, their converging sides, a usually rounded cross-section and no definite shoulder between beater portion and handle. Carving mallets lack the grooves but often do follow the other three criteria to some extent. However, their pattern of wear from striking the chisel handle is very obvious and their rectangular cross-section is usually very flattened. *Patuki* lack the longitudinal grooves but their sides are usually covered with a surface decoration of carving motifs, their cross-section is usually diamond-shaped sometimes with slightly concave sides, and their sides converge to a definite point at the distal end.

Apart from the above categories of beaters, another category of Maori wooden beater occurs in museum collections with much greater frequency than obvious barkcloth beaters but is not nearly as common as standard fernroot beaters. This category consists of small,

lightweight beaters, similar in size to the known Maori barkcloth beaters and sharing all of their criteria except for the longitudinal grooves. All of the beating facets on this category of beater are finished as a smooth surface. They may be a variety of fernroot beater or intended for some other form of food preparation or fibre treatment. However, their close similarity to Maori barkcloth beaters some of which also have up to three smooth sides, does raise the possibility that these totally smooth-sided beaters were also barkcloth beaters. Tapa beaters with all beating facets smooth without any grooves are recorded from Samoa and Hawaii (Kooijman 1972:104, 289), while tapa beaters with one or more facets ungrooved are widely found in Easter Island, Fiji, Hawaii, Mangareva, Niue, Samoa and Tonga. In Samoa, the beater with all facets smooth is called an *i'e mole* (Buck 1930:289). In Fiji, Hawaii and Samoa, it is recorded that the smooth surface of the beater was used last in the beating process, to produce the finest textured effect on the cloth (Kooijman 1972:108, 352; Neich 1985:43). More research on this category of New Zealand beater is required, perhaps with a microscopic examination for any residues on their beating surfaces. Beaters of this category have not been documented for the present study.

Maori collections in public museums in the following places have been checked personally for any previously unrecognised Maori barkcloth beaters: Auckland, Cambridge, Christchurch, Dargaville, Dunedin, Gisborne, Hamilton, Holdens Bay at Rotorua, Houhora, Invercargill, Kaeo, Kaikohe, Kaitaia, Matakoho, Napier, Nelson, New Plymouth, Okain's Bay, Paeroa, Palmerston North, Papakura, Rotorua, Russell, Tauranga, Te Awamutu, Thames, Waihi, Waipu, Whakatane, Whanganui, Whangarei, Wellington, Whitianga. In addition to these museum collections, I have also checked the artefacts from the Kohika site near Whakatane, the Murdock private collection at Hikutaia, and the national "Y" and "Z" registers of Maori artefacts. Many overseas museum collections have also been personally checked in Great Britain, Australia, Hawaii, United States of America, and Europe. I have also had access to the records of Maori collections in North America and Europe compiled by D.R. Simmons at Auckland Museum.

A purported small stone barkcloth beater from Tairua on the Coromandel Peninsula was reported by Simmons (1978:14) which he claimed "indicates that barkcloth was made in New Zealand from about AD 1000". On examination, this item (Auckland Museum number 18,813) has proved to be a small cylinder of fine-grained tuff or calcareous mudstone covered with low relief stylised faces and cross-hatched surface decoration, of no known date or archaeological context. It is not a barkcloth beater. Simmons's comparison of this item to supposed stone or ceramic tapa beater fragments from Tonga, presumably those reported by Skinner (1966), is also invalid, since these had been demonstrated by Key (1969) to be fragments of discarded modern oven bricks.

Only one purported New Zealand barkcloth beater has been reported in a museum collection outside New Zealand. This was published by Simmons (1982:277) as being in the collection of the Buffalo Museum of Science, Buffalo, New York State, registration number 40124, the result of an exchange with Auckland Museum in 1940. Simmons described this beater as "Finely grooved on four sides, round handle, square body. Length 41.2 cm." However, information supplied by Kevin Smith, Associate Curator of Anthropology, Buffalo Museum of Science (Pers. comm. 8 February 1996) has confirmed that this beater was previously Auckland Museum registration number 18447.10, recorded in both Auckland Museum and Buffalo Museum catalogues as coming from Rurutu in the Austral Islands. It can therefore be definitely excluded from the corpus of known New Zealand barkcloth beaters.

By applying the four distinguishing criteria outlined above, the following Maori barkcloth beaters have been identified. All of the wood identifications have been carried out by

Dr Rod Wallace, Department of Archaeology, University of Auckland, using microscopic analysis of a stained sample, unless otherwise stated. The localities where these beaters were found have been plotted on the map (Fig. 1) referenced by the Roman numeral assigned to each beater.

I. Te Puna, Tauranga (Fig. 3)

Locality: Te Puna, Tauranga. No other information available.

Repository: Te Amorangi Museum, Holden's Bay, Rotorua.

Museum registration number: 2491.

Provenance: Presented to Te Amorangi Museum by Mr Thomas Tu of Te Puna, Tauranga in October 1964.

Weight: 655.5 g.

Size: 33.5 cm long, 6.3 cm wide. Beating facets 23 cm long, 6 cm wide.

Wood: Kauri (Dr R. Wallace, pers. comm. 12 July 1993). Tauranga is just within the geographical growth range of kauri.

Description: All four beating facets with longitudinal grooves. Dark brown colour. Patinated, battered, worn surface. Tapered handle. Low shoulder between handle and beater portion. Beater portion has rounded square cross-section with no break in grooves around the total circumference of the cross-section. Beater facets parallel but slight bulge at middle. Longitudinal grooves wide and ridges rounded. Same gauge grooving on all facets with three grooves per centimetre and 11-12 grooves on each beater facet. Almost certainly made by stone tools.

References: Not previously published.

II. Warea, Taranaki (Fig. 4)

Locality: Found in swamp adjacent to Tapuinikau pa, near Warea. Tapuinikau pa was a major position for the Nga Mahanga hapu, the Patu Kai hapu and the Ngati Moeahu hapu of the Taranaki tribe. In the early nineteenth century, it was assaulted by northern raiders under Murupaenga. The main pa occupies a prominent westernmost hill with a series of ditches and scarps around the northern side and two other defended areas further up the ridge (Prickett 1990:36). The beater is said to have been found right at the foot of the pa, in the upper end of a farm drain. Other artefacts such as a storehouse threshold carving, spear, digging stick, and adze haft have been found in the same swampy area. Now known as the Donald swamp, this swampy area was named Kiakia in an early surveyor's notebook.

Repository: Taranaki Museum.

Museum registration number: A 67.154.

Provenance: Found by Mr J. Donald in 1967. Presented to Taranaki Museum in May 1967 by Mr Donald.

Weight: 290 g.

Size: 30.5 cm long, 4.5 cm wide on broad side, 3.6 cm wide on narrow side. Beating facet 16.5 cm long, 3.6 cm wide.

Wood: Totara or rimu (Wallace 1989:226).

Description: Four beating facets, only one with grooves. Light brown colour. Very carefully-made, well-shaped and finely-finished with signs of wear on the handle and some decay at the butt. Flat ridge 2 cm wide around butt, with shoulder to handle. Slightly tapered handle with rounded 3.5 cm maximum square cross-section. Sharp shoulder between handle and beater portion. Beater portion has rectangular cross-section, 4.5 cm wide and 3.6 cm wide, with grooves on one narrow side only. The other three facets are smooth. All facets are parallel with edges between them rounded. Distal end convex. Single narrow facet with pattern of

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Figs 3-5. Maori barkcloth beaters. 3. I, Te Puna, Tauranga. 4. II, Warea, Taranaki. 5. III, Waikato.

longitudinal grooves interrupted by four sets of diagonal grooves, the central two sets in form of triangular chevrons. Longitudinal grooves are deep and straight-sided with flat-topped ridges between, about same width as depth, three grooves per centimetre. The diagonal grooves are much shallower, incised into a flat surface which has been left raised between the longitudinal grooved areas.

References: Day 1984:16.

Discussion: This pattern of longitudinal and diagonal grooves is unique among New Zealand barkcloth beaters. It recalls the patterned bone lacebark beater described by Hammond at Hokianga (Hamilton 1896:273) and may be compared with a diamond-patterned tapa beater from Tubuai and beaters with various patterned facets from Hawaii (Kooijman 1972:75, 107 ff). If this Warea beater indicates that *Broussonetia papyrifera* was being grown in the Warea district, then this constitutes the only record for aute growing in Taranaki. However, Hamilton (1896:293) did make an unreferenced remark that “older Taranaki people speak of it [aute] having been grown there in their fathers’ time”.

III. Waikato (Fig. 5)

Locality: Probably Waikato but no definite information.

Repository: Te Awamutu Museum.

Museum registration number: 684-154.

Provenance: No information available.

Weight: 421.4 g.

Size: 28 cm long, 6.5 cm wide. Beating facet 12 cm long, 4 cm wide.

Wood: Kauri (Dr R. Wallace, pers. comm. 12 July 1993, by hand specimen examination only).

Description: Four beating facets, one smooth, other three with longitudinal grooves. Dark brown patinated wood with large splits. Handle worn from use. Ridges of beating facets worn shallow, ridges flattened down. Grooves filled with black detritus and plant fibres. Tapered handle. Low shoulders between handle and beating facets. Beating section has rounded square cross-section, with smooth side convex. Junction of edges between beating facets is rounded. Slight longitudinal taper on all facets. Three grooved facets with fine longitudinal grooves, all at same gauge, 3-4 grooves per centimetre and 13-14 grooves per facet. Cutting of grooves and shaping of beater looks like stone-tool work. Modern hole drilled in handle.

References: Not previously published.

IV. Waikato/Te Awamutu (Fig. 6)

Locality: Probably from Waikato/Te Awamutu area.

Repository: Wagener Museum, Houhora.

Museum registration number: 5268.

Provenance: Part of a private collection from the Waikato area purchased for the Wagener Museum.

Size: 26.5 cm long, 7 cm wide. Beater section 16 cm long.

Wood: Kauri (Dr R. Wallace, pers. comm. 9 June 1994).

Description: Three beating facets, one smooth, two with longitudinal grooves. Light brown wood with fine clean grain. Black patina on some areas of surface. Foliating splits with open pithy area down centre. Much of one side of handle split away. Very steep shoulder between handle and beater section. Much of the beater section has split away, leaving the original cross-section unclear but suggesting almost an hexagonal cross-section. One beater facet smooth. Two adjacent beater facets with longitudinal grooves running full length of facet. Grooving slightly closer together on one facet but both about three grooves per centimetre. Cuts across

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Figs 6-8. Maori barkcloth beaters. 6. IV, Waikato/Te Awamutu area. 7. V, Waikato/Te Awamutu area. 8. VI, Kaipara Harbour.

the grain look like stone-tool work.

References: Not previously published.

Discussion: The most interesting feature of this beater is its unusual cross-section, unfortunately marred by splitting and wood-loss.

V. Waikato/Te Awamutu (Fig. 7)

Locality: Probably from Waikato/Te Awamutu area.

Repository: Wagener Museum, Houhora.

Museum registration number: 5269.

Provenance: Part of a private collection from the Waikato area, purchased for the Wagener Museum.

Size: 29 cm long, 5.5 cm wide. Beater section 15 cm long.

Wood: Kauri (Dr R. Wallace, pers. comm. 9 June 1994).

Description: Three beating facets, all with longitudinal grooves. Light brown wood with dense fine grain. Splits. Does not look like a swamp find. Slight knob on butt. Slight shoulder between handle and beater section. Beater portion with rounded, almost triangular cross-section. Longitudinal grooves at slightly different gauge on each facet; two grooves per centimetre on first, three grooves per centimetre on second and slightly more than three per centimetre on third.

References: Not previously published.

Discussion: The rounded, almost triangular cross-section of this beater is unique among all other New Zealand barkcloth beaters, although it does occur occasionally within the wider Pacific, such as Fiji and Samoa (Kooijman 1972; Tolstoy 1994).

VI. Kaipara Harbour (Fig. 8)

Locality: Found with part of the handle exposed in mud at low tide, Wainonororo Creek, Whakaki River, Kaipara Harbour. Barkcloth beater VII was found at the same locality but at a different time. Adzes and sinkers have often been found around these beaches (Mr Colin Brown, Kerikeri, son-in-law of finder, pers. comm., 25 March 1994).

Repository: Okain's Bay Maori and Colonial Museum, Bank's Peninsula.

Museum registration number: Y789 in Antiquities National Register.

Provenance: Found by local farmer, Geoffrey V. Linnell, Oneriri Road, Kaiwaka in about the 1950s. Purchased at Dunbar Sloane's auction, Wellington, 26 May 1994.

Size: 23.8 cm long, 4.7 cm wide. Handle 6.2 cm long.

Wood: Kauri (Dr R. Wallace, pers. comm. 9 June 1994).

Description: Two beating facets with longitudinal grooves, other curved surface smooth. Dark brown dense wood with shiny patina. All very worn and much-used. Enlarged butt knob. Definite sharp shoulder between handle and beating portion. In cross-section, the beating portion has two grooved sides at angle of about 50 degrees, joined by smooth circular section. One grooved facet is 14 cm long, 3.7 cm wide, the other is 14 cm long, 3 cm wide. Both sets of longitudinal grooves are shallow and same gauge, about five grooves per centimetre. There is possibly very shallow, irregular grooving on the smooth face. There are very sharp cuts across the grain around the shoulders which may almost suggest metal-tool work. A very well-shaped and finished artefact.

References: Not previously published.

Discussion: This form of cross-section is most unusual among barkcloth beaters, both in New Zealand and elsewhere. Along with the fine gauge of the grooving, this suggests that beater VI is a very specialised type of artefact.

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Figs 9-11. Maori barkcloth beaters. 9. VII, Kaipara Harbour. 10. VIII, Whangarei. 11. IX, Whangarei.

VII. Kaipara Harbour (Fig. 9)

Locality: Found exposed in mud at low tide, Wainonororo Creek, Whakaki River, Kaipara Harbour. Barkcloth beater VI was found at the same locality but at a different time (Mr Colin Brown, Kerikeri, son-in-law of finder, pers. comm., 25 March 1994).

Repository: Auckland Museum.

Museum registration number: 49957, Y788 in Antiquities National Register.

Provenance: Found by local farmer, Geoffrey V. Linnell, Oneriri Road, Kaiwaka, in about the 1950s. Purchased at George Walker's auction, Auckland, 1982.

Weight: 205.1 g.

Size: 25.5 cm long, 4.5 cm wide, beater section 16 cm long.

Wood: Kauri (Dr R. Wallace, pers. comm. 12 July 1993).

Description: One beating facet with definite longitudinal grooves, other three facets with possible grooves but very waterworn. Handle broken away at end. Large Teredo worm borings. Light brown, close-grained wood. Tapered circular-sectioned handle, offset toward side with prominent grooves. Definite shoulder between handle and beater section with large rough cuts across the grain. Beater section is slightly rectangular in cross-section with rounded edges. Slight longitudinal curve to whole beater with main grooved facet, 16 cm long by 4 cm wide, on outer curve. Grooves very shallow and worn, about two to three grooves per centimetre. Distal end of beater cut off at angle with irregular cuts. This beater has the appearance of stone-tool work but its waterworn condition precludes a definite determination.

References: Not previously published.

VIII. Whangarei (Fig. 10)

Locality: Found with beater IX. "Recovered during dredging operations in the Hatea River, (headwaters of Whangarei Harbour) in May, 1923. They were found close together, about six feet deep, in an old gravel bed which is covered by the tide at high water. From a geological view point, I should say that these relics had been carried down by floods from one of the upper valleys not less than 400 years ago." (W.M. Fraser, in Buck 1924:37).

Repository: Auckland Museum.

Museum registration number: 8083.

Provenance: Found by Mr W.M. Fraser, Harbour Board Engineer, Whangarei in May 1923. Presented to Auckland Museum by Mr W.M. Fraser in 1924.

Weight: 203.0 g.

Size: 27.3 cm long, 4.7 cm wide, beater section 9.5 cm long.

Wood: Kauri (Wallace 1989:226).

Description: Two opposed beating facets with longitudinal grooves, other two facets smooth. Light brown wood covered with powdery green and white precipitate. Curved longitudinally with the grain, perhaps as a result of uncontrolled drying. Large rough hole pierced through distal end. Handle circular in cross section, tapering from 3.4 cm diameter at shoulder to 1.9 cm diameter at butt. Definite shoulder between handle and two beating facets, smooth junction between handle and smooth facets. Beater section rectangular 4.5 cm by 3 cm in cross-section at shoulder, expanding to 4.5 cm square cross-section at distal end. Opposed beating facets parallel to each other, opposed smooth facets diverge to expanded end. Shallow straight longitudinal grooves at same gauge on both facets, about four grooves per centimetre. Extra grooves added to fill expanded surface towards end. Distal end of beater projects with four-sided pyramidal appearance.

References: Buck 1924:34-37.

Discussion: Buck thought that the wood of this beater looked like manuka but Wallace has

identified it definitely as kauri, the same wood as the other beater found with it. A delicate, carefully finished artefact.

IX. Whangarei (Fig. 11)

Locality: Found with beater VIII as described in previous entry.

Repository: Auckland Museum.

Museum registration number: 8084.

Provenance: Found by Mr W.M. Fraser, Harbour Board Engineer, Whangarei in May 1923. Presented to Auckland Museum by Mr W.M. Fraser in 1924.

Weight: 402.8 g.

Size: 31.4 cm long, 5.3 cm wide. Beater portion 17 cm long.

Wood: Kauri (Wallace 1989:226).

Description: Three beating facets with longitudinal grooves, one facet smooth. Light brown wood, very straight grain, with some surface splitting and flaking due to rapid drying. Very slight longitudinal curve with main beating facet on outer convexity. Signs of wear. Definite sharply-cut shoulder between handle and beater portion. Handle circular in cross-section tapering from 3.5 cm diameter at the shoulder to 2.5 cm diameter at the butt. Beater portion rectangular in cross-section with rounded edges. Main beating facet is 17 cm long and tapers from 5 cm wide at distal end to 3.6 cm wide at shoulder, with longitudinal grooves five per centimetre, fine and regular for the length of the facet. Smooth facet opposite this with same dimensions. Other two opposed facets are both about 3.5 cm wide with no noticeable taper. The longitudinal grooves on these two facets are very lightly incised into the smooth surface and are quite irregular. Buck (1924:36) reported that these grooves were spaced at five per centimetre on one facet and four per centimetre on the other. The distal end of the beater is cut off almost square.

References: Buck 1924:34-37.

Discussion: This is a finely-finished, well-balanced artefact able to impart considerable force and weight to its impact.

X. Whangaruru, North Auckland (Fig. 12)

Locality: Found during very low tide, well off-shore in the mudflats of Tuparehuia Bay, Whangaruru Harbour (M.K. Lamont, son of finders, pers. comm., 9 November 1995). There are numerous pa sites and other evidence of Maori occupation in this area.

Repository: Auckland Museum.

Museum registration number: 45305.

Provenance: Found in 1972 by Mr and Mrs J.N. Lamont, who presented it to Auckland Museum later that year.

Weight: 609.4 g.

Size: 34.9 cm long, 6.1 cm wide on broad side, 5.2 cm wide on narrow side. Beater portion 21.3 cm long.

Wood: Kauri (Wallace 1989:226).

Description: All four beating facets with longitudinal grooves. Light brown wood, deeply split and surface blackened and scaled from shrinkage caused by rapid uncontrolled drying. Signs of wear on some faces and edges. Round cross-sectioned handle, 3.2 cm diameter, offset towards one corner of the beater cross-section. Definite sharp shoulder between handle and beater portion. Beater portion has rectangular cross-section with sides 5.2 cm, 6.0 cm, 6.1 cm in width. Edges rounded. Beater facets parallel. Longitudinal grooves are shallow in section with flattened ridges between. Grooves all same gauge on all four facets, about five per

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Figs 12-14. Maori barkcloth beaters. 12. X, Whangaruru. 13. XI, Waiuku. 14. XII, Auckland City.

centimetre. Cut off square at distal end. Probably stone tool work, judging from the irregularity of the cuts across the grain at the shoulders.

References: Not previously published.

Discussion: One of the larger beaters in the corpus, with an exceptionally large area of beating surface, all at same gauge of grooving.

XI. Aka Aka, South Auckland (Fig. 13)

Locality: Recovered totally waterlogged from mud in the bed of the Aka Aka Stream behind the old dairy factory at Aka Aka, 5 km south-east of Waiuku by Mr G.A. Holmes in 1961 while operating a dragline for the local drainage board (Mr G.A. Holmes, pers. comm., 20 October 1995). This is an area of low-lying swampy river flats, crossed by the meandering Aka Aka Stream on its way to join the Waikato River.

Repository: Auckland Museum.

Museum registration number: 36234.

Provenance: Presented to Auckland Museum by Mr G.A. Holmes of Aka Aka in 1961. A hinaki and a pumice bowl were presented by Mr Holmes at the same time, found nearby in the Aka Aka Stream but not from the same site as the barkcloth beater.

Weight: 527.9 g.

Size: 31.4 cm long, 5.1 cm wide. Beater portion 19 cm long.

Wood: Kauri (Dr R. Wallace, pers. comm. 12 July 1993).

Description: Four beating facets, all with prominent longitudinal grooves. Dark brown colour. Light-weight, close-grained wood with sound surface and only minimal splitting. Grooves very fresh with little sign of wear but handle smoothed from use. Butt rounded. Proximal end of handle flared. Definite small shoulder between handle and beater portion. Handle circular in cross-section tapering from 4 cm diameter at shoulder to 3.2 cm diameter below flared butt. Beater portion quadrangular in cross-section with slightly rounded edges. Beater facets 5.1 cm, 4.6 cm, 4.5 cm and 3.7 cm wide. Longitudinal grooves deep with high rounded ridges between. Three grooves per centimetre on all beater facets. Distal end of beater slightly convex.

References: Not previously published.

Discussion: Outstanding as the most elegantly-shaped and most highly-finished among all other Maori barkcloth beaters.

XII. Auckland City (Fig. 14)

Locality: Dug up in excavations for Vulcan Building, Queen Street, Auckland.

Repository: Auckland Museum.

Museum registration number: 2935.

Provenance: Presented to Auckland Museum by Mr A. Turner in 1928.

Weight: 751.1 g.

Size: 37 cm long, 7.6 cm wide.

Wood: Kauri (Wallace 1989:226).

Description: One small longitudinally-grooved beating facet on short length of one side. Light brown wood in solid condition with some surface splits and flaking. Slight curve to handle with beating facet on outer arc of curve. Irregular shape with minimal shoulder between handle and beater portion. Enlarged butt. Handle sub-circular in cross-section tapering from 5 cm diameter at shoulder to 3.8 cm diameter at butt. Beater portion irregular in cross-section, basically very rounded triangular but with knotted grain enlargement at distal

end. Longitudinal grooved beating facet 9 cm long by 4 cm wide but distal extension of grooving destroyed by recent cuts. Three grooves per centimetre.

References: Not previously published.

Discussion: One of the most irregularly-shaped of the New Zealand barkcloth beaters and closer in form to a fernroot beater than the others. The irregular shape, minimal shoulders and the small area of grooved beater facet may suggest that this implement was originally conceived as a fernroot beater and only later converted into a barkcloth beater.

XIII. Unlocalised (Fig. 15)

Locality: Not recorded.

Repository: Auckland Museum.

Museum registration number: 3148.

Provenance: Vaile Collection, which means that it was purchased from a private vendor, in 1929, with funds provided by the Edward Earle Vaile Trust Fund. Searches for more information in museum archives have been unsuccessful.

Weight: 282.6 g.

Size: 29 cm long, 5.6 cm wide. Beater facet 12 cm long.

Wood: Kauri (Wallace 1989:226).

Description: One longitudinally-grooved beating facet. Light brown wood with numerous splits. Signs of wear on handle. Enlarged irregular knob, 6 cm long, on butt with edge-notching and possible indication of a rudimentary face. Circular-sectioned handle continuing without any definite shoulder into beating portion. Rounded flat cross-section to beating portion with some flattened facets. Irregular, widely-spaced longitudinal grooves, two per centimetre, on flat facet with no definite boundary to grooved area. Wide flat ridges between the grooves. Distal end bulbous with sharply-cut facets suggesting metal-tool cuts.

References: Not previously published.

Discussion: This implement is distinguished from all the other barkcloth beaters by the deliberately-shaped butt enlargement. However, in terms of its irregular shape, longitudinal grooves confined to limited area of a side, and lack of definite shoulders, there is an obvious affinity with beater XII.

XIV. Lake Mangakaware, Waikato (Fig. 16)

Locality: Found with many other wooden artefacts in the mud on the bed of Lake Mangakaware, in the vicinity of pa site MA 1, one of three prehistoric Maori swamp fortifications on the shores of Lake Mangakaware (Bellwood 1978:50, 51, 52, Fig.20). This lake is situated 20 km south-west of Hamilton and 13 km north-west of Te Awamutu. The Mangakaware area was settled by the Ngati Puhiaawe, a branch of Ngati Apakura, traditionally sometime after A.D. 1500.

Repository: Waikato Museum.

Museum registration number: 1972/103/106. (MA 203 in excavation report, Bellwood 1978).

Provenance: Recovered in April 1969 by members of the Waikato Archaeological Society under the direction of Mr D. Pick. Then passed on to the Waikato Museum by Peter Bellwood and the Department of Anthropology of Auckland University in 1972.

Weight: 270.5 g.

Size: 26.2 cm long, 5.3 cm wide.

Wood: Branch matai (Dr R. Wallace, pers. comm. 12 July 1996).

Description: Small portion of one facet bears longitudinal grooves. Very light-coloured brown wood with dark grain inclusions. Burnt on one side, otherwise sound. Cuts very fresh.

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Figs 15-16. Maori barkcloth beaters. 15. XIII, unlocalised. 16. XIV, Lake Mangakaware.

Slight longitudinal curve. No definite shoulders between handle and beater portion. General expansion in diameter towards distal end. Circular-sectioned handle with expanded butt 3.3 cm wide. Beater portion irregular in cross-section but with four definite flat facets and rest rounded. Four or five longitudinal grooves about 10 cm long on restricted area of one facet only. Grooves very shallow with low flat ridges between. Four grooves per centimetre.

References: Bellwood 1978; Davidson 1984:Fig.74c.

Discussion: This artefact has previously been described in the literature as a fernroot beater but the presence of longitudinal grooves clearly identifies it as a barkcloth beater. It is the only New Zealand barkcloth beater found in association with a controlled archaeological excavation which yielded a radiocarbon dating within the sixteenth and seventeenth centuries for the occupation of the Mangakaware pa sites (Bellwood 1978:71).

MAORI BARKCLOTH BEATERS IN COMPARATIVE PERSPECTIVE

The preferred wood for making these barkcloth beaters was almost exclusively branch heartwood of the New Zealand kauri (*Agathis australis*), except in areas completely beyond or on the borders of the geographical growth range of kauri (Ecroyd 1982:22-23) where rimu or totara and matai were substituted. Kauri branch heartwood is considerably denser than trunk wood and is almost totally impregnated with a hard resin. Wherever it was available, it was the preferred wood for fernroot beaters, mauls, weapons and barkcloth beaters (Wallace 1989:223). New Zealand kauri wood is not distinguishable, by the techniques used here, from wood derived from other species of the tropical conifer *Agathis* which are found in New Caledonia, Fiji, Vanuatu, Solomon Islands, Queensland and Papua New Guinea (Whitmore and Page 1980). But *Agathis* does not occur in tropical Polynesia. On this basis, the identification of wood in a New Zealand barkcloth beater as kauri rules out any possibility that the beater may be an import from tropical Polynesia.

For the beater from Taranaki which is well beyond the growth range of kauri, rimu or totara was substituted. The only other timber used was branchwood matai (*Prumnopitys taxifolia*) for the Mangakaware barkcloth beater in the Waikato which is an overlap area for the southern boundary of natural kauri distribution. Therefore, this single use of matai may have been a substitution for the preferred but unavailable kauri, although matai was also a preferred timber for artefacts requiring a strong dense hardwood (Wallace 1989:227).

The most noticeable characteristic of this corpus of New Zealand barkcloth beaters must be their sheer diversity of form, if viewed in comparison to the regularities of form encountered within each of the tropical Polynesian island culture areas. This is especially apparent when their cross-sections and placement of grooved beating facets are compared.

Nevertheless, there are some regularities of form among New Zealand barkcloth beaters. All have a clear distinction between handle and beater portion, always with different cross-sections for handle and beater. None have a completely circular cross-section for the beater portion and consequently there are always distinct beating facets. On some individual beaters, these beating facets display such differences as smooth versus grooved or variations in gauge of grooving. Other regularities might be based on presence or absence of a butt enlargement, sharpness of shoulders between handle and beater portion, and degree of taper in the overall form of the beater.

When these distinctive features are plotted on a table (Table 1), a useful summary of beater features is produced. From this summary, a typical form of New Zealand Maori barkcloth beater might be characterised as quadrangular in cross-section, shouldered either sharply or gradually between handle and beating portion, often with an enlarged butt, almost

Table 1. Distinctive features of New Zealand barkcloth beaters.

BEATERS FEATURES	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
Quadrangular X-section	X	X	X				X	X	X	X	X			
Triangular X-section					X							X		
Circular arc X-section						X								
Multi-facet X-section				X									X	X
Sharp shouldered		X		X		X	X		X	X				
Gradual shouldered	X		X		X			X			X	X	X	X
Butt enlargement		X			X	X					X	X	X	X
No butt enlargement	X		X	X			X	X	X	X				
Overall tapered form			X		X			X	X		X	X	X	X
Overall parallel form	X	X		X		X	X			X				
Plain longitudinal grooves	X		X	X	X	X	X	X	X	X	X	X	X	X
Patterned grooves		X												
One facet grooved		X					X					X	X	X
Two facets grooved				X		X		X						
Three facets grooved			X		X				X					
Four facets grooved	X									X	X			
Variation in gauge				X	X				X					
No variation in gauge	X	X	X			X	X	X		X	X	X	X	X

always having only plain longitudinal grooves which are equally likely to be placed on one, two, three or four of the beating facets leaving ungrooved facets smooth, and generally with a constant gauge of grooving on each individual beater.

A plotting of the lengths of these known barkcloth beaters (Fig. 17) indicates that they conform to a fairly limited size range of between 23.8 and 37 cm long, with an average length of 29.5 cm. Also noticeable, when the obviously atypical beater XII is discounted, is the relative constancy of the proportion of beating facet length to total beater length which varies only between 34.7 % and 68.6 %, between 51% and 63% for the majority of beaters.

However, beyond this generalised form there may be significant groupings of barkcloth beater forms based on clusters of distinctive features. In order to gain some idea of whether these features are functionally differentiated or geographically differentiated, their distribution has been plotted on a map of the North Island (Fig. 18). Disregarding the probable influence of numerous other variable factors such as contingency of discovery and multi-function beaters, one would expect that functionally differentiated features would be distributed randomly across the country while regionally differentiated features would cluster in geographical areas.

Unfortunately, the sample size is far too small for any such geographical distribution to be conclusive. However, it does show that quadrangular beater cross-sections are distributed evenly across the full geographical range of New Zealand barkcloth beaters, while triangular and multi-facet cross-sections are limited to the Auckland/Waikato area. Sharp shoulders are

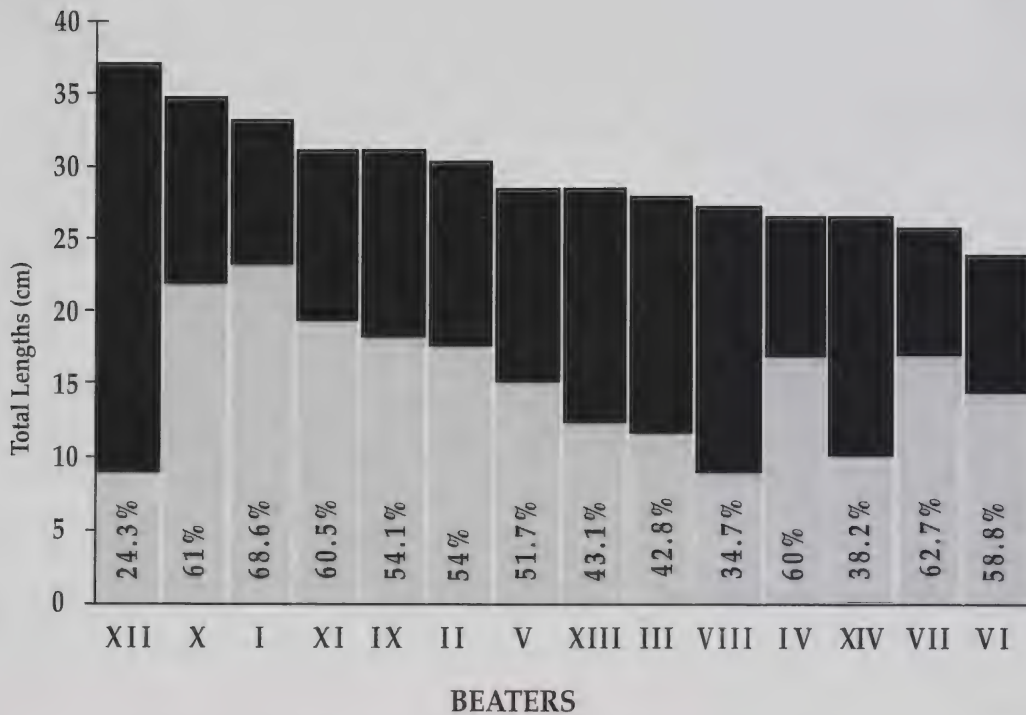


Fig. 17. Lengths of New Zealand barkcloth beaters, showing beating facet as percentage of total.

concentrated in North Auckland, but extend to the Waikato and Taranaki. Gradual shoulders are concentrated in the Auckland/Waikato area with one example each in North Auckland and Tauranga. Enlarged butts are fairly evenly distributed from the Kaipara to the Waikato and into Taranaki. Overall tapered forms are found in North Auckland and again in the Auckland/Waikato region. Overall parallel forms are evenly distributed throughout the barkcloth beater range. Patterned grooves are a unique occurrence in Taranaki, with all the others displaying plain longitudinal grooves. One beating facet beaters are found in the Kaipara/Auckland, Waikato and Taranaki areas. Two beating facet beaters extend from Whangarei to the Waikato, as do three beating facets. Four beating facets are scattered from Whangaruru to Waiuku to Tauranga. Variations in gauge are found only at the two geographical extremes of continuous beater distribution.

On the basis of these distinctive features, some categorical groupings of beater forms begin to emerge although there are obviously many different valid ways to group these beaters typologically. Features such as presence or absence of a butt enlargement, overall tapered or parallel form, number of grooved facets, and presence or absence of groove gauge variation seem to be less diagnostic and more random than the obvious simple features of cross-sectional shape and shoulder forms.

The application of these two features of cross-sectional shape and shoulder form creates a useful working typology of all the New Zealand barkcloth beaters, as follows:

- Type 1. Quadrangular cross-section, sharp shoulders.
Beaters II, VII, IX, X.
- Type 2. Quadrangular cross-section, gradual shoulders.
Beaters I, III, VIII, XI.

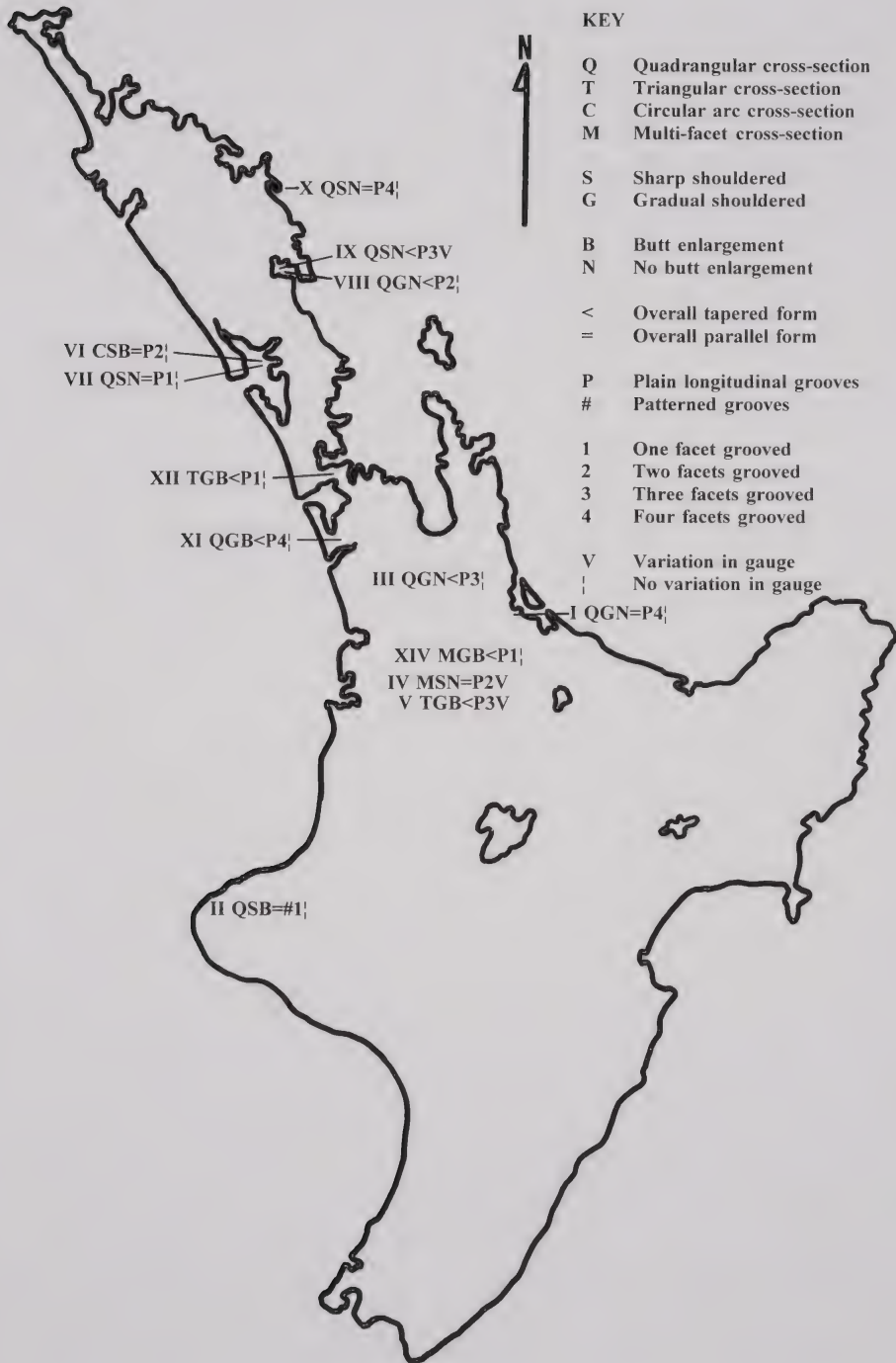


Fig. 18. Map of the North Island showing the geographic distribution of distinctive features of Maori barkcloth beaters.

Type 3. Triangular cross-section, gradual shoulders.

Beaters V, XII.

Type 4. Multi-facet and rounded cross-section.

Beaters IV, VI, XIII, XIV.

Type 4 could be further subdivided on the basis of shoulder form but this is hardly justified with such a small corpus. In terms of their geographical distribution, Type 1 occurs in North Auckland and Taranaki, Type 2 in Whangarei, Waikato and Tauranga, Type 3 in Auckland and Waikato, and Type 4 in Kaipara and Waikato.

Faced with a comparable diversity in early Maori woodcarving styles, Sutton (1987) has suggested the possibility of multiple island origins for Polynesian settlement of New Zealand over a long period of time, in contrast to the usually accepted assumption of a single and comparatively late colonisation. The diversity of barkcloth beater forms in New Zealand may also lend support to the suggestion of multiple origins, but the temporal span of the known New Zealand beaters is more problematical. Some of them may have been retained since last use as family heirlooms in an ethnographic context, but most are reported as having been found, probably implying their recovery from the ground. Only one, the beater from Mangakaware (XIV), has been found in association with a controlled archaeological excavation, providing the earliest date for a New Zealand barkcloth beater, within the sixteenth and seventeenth centuries. Some definite but minimal archaeological context has also been noted for beaters II, VI, VII, VIII, IX, XI, and XII. Beaters II and XI were found in swamps in association with other artefacts of late classical Maori or even post-contact date. Beater XII was dug up from a building site at an unspecified depth. Beaters VI and VII were found in tidal estuarine mud, while beaters VIII and IX came from tidal estuarine gravels reputedly indicating some considerable antiquity. However, in the absence of any better-recorded archaeological contexts or absolute datings for the New Zealand barkcloth beaters, it is not possible on the evidence now available to establish any chronology of stylistic variation for barkcloth beaters such as Sutton has called for in studies of early Maori woodcarvings.

In a wider Polynesian comparative perspective, the New Zealand barkcloth beaters generally have a greater affinity with the straight parallel-sided and fine-grooved beaters of Eastern Polynesia (Tahiti, Cooks, Australs, Marquesas, Hawaii) rather than the strongly-tapered and coarsely-grooved beaters of Central Polynesia (Tonga, Samoa, Niue). Buck (1944:431) came to the same conclusion in an early general comparison of Polynesian tapa beaters, but as he was only aware of the two New Zealand beaters from Whangarei his generalisations can now be considerably refined. The New Zealand beaters of Type 2 show the closest similarity to other tropical Polynesian tapa beaters with their quadrangular cross-sections and gradual shoulders. Indeed, such sharp shoulders as seen on the New Zealand beaters of Type 1 are a definite rarity among Polynesian beaters. Consequently, the contrast in size between handle cross-section and beating portion cross-section so marked on many New Zealand beaters, especially those of Type 1, is not a feature of most tropical Polynesian beaters.

Barkcloth beaters with a triangular cross-section as seen on New Zealand Type 3 barkcloth beaters are very rare in tropical Polynesia, with those from Fiji being the best documented (Kooijman 1972:351). Even more unusual in Polynesian terms are the beaters of New Zealand Type 4 where the cross-section is a complex arrangement of two or three facets at an angle joined by an arc of a circle. New Zealand beater IV is even more remarkable with its remaining three facets and suggestion of an original hexagonal cross-section. On the evidence of presently-known Polynesian barkcloth beaters, the New Zealand Type 4 beater would seem to be a uniquely New Zealand Maori innovation. Or alternatively, it might represent an archaic survival at the periphery of distribution.

Most tropical Polynesian beaters have a proportionally longer beating facet than the New Zealand beaters. Tropical Polynesian beaters are also distinguished from the New Zealand beaters by the fineness of the grooving on the finest facets of the tropical Polynesian beaters. The New Zealand beaters with a maximum of five grooves per centimetre and an average of about three grooves per centimetre never display the extreme fine gauge of grooving as seen on some tapa beaters from Tahiti for example. The diagonal grooves on New Zealand beater II are apparently unique within Polynesia, although suggesting similarities to the patterned beaters of Hawaii.

The prominent butt enlargement marked off from the handle by sharp shoulders on New Zealand beaters II, V, VI, XIII and XIV contrasts strongly with the small flared butt enlargement seen on many ethnographic tropical Polynesian tapa beaters. Beater XI from the New Zealand corpus is the only one that displays this typical tropical Polynesian beater characteristic. Overall, this corpus of New Zealand barkcloth beaters with its butt enlargements and complex of cross-sectional forms might tend to suggest some degree of archaic conservatism at the periphery of diffusion.

COMPARISON OF MAORI AND EARLY HUAHINE BEATERS

These comparisons with ethnographically-recorded, mainly nineteenth century, Polynesian barkcloth beaters can be supplemented by comparisons with the only known ancient Polynesian tapa beaters, those recovered from the archaeological site of Vaito'otia/Fa'ahia on Huahine in the Society Islands. The ancient Polynesian occupation of this site has been radiocarbon dated between A.D.850 and A.D.1200 (Sinoto 1979:21; 1983:71), although Sinoto (1983a:59; 1983b:594) believes that occupation must have begun earlier than this. On the basis of similarities in 'patu' hand clubs, adze blades, shaped whale-tooth pendants and harpoon heads found at Vaito'otia/Fa'ahia, Sinoto (1983:70, 72; 1983a:57, 59; 1983b:596-597) has suggested a link between this Huahine assemblage and archaic Maori material culture in New Zealand. He believes that this link supports his hypothesis of an early sequential initial settlement from the Society Islands to New Zealand. However, while accepting most of the artefact similarities between the Huahine site and archaic New Zealand, Davidson (1984:94) and Sutton (1987:145) have pointed out the considerable differences in adze types.

A comparison of the barkcloth beaters from this Huahine site can now be made with this corpus of New Zealand barkcloth beaters, to examine whether or not they support Sinoto's hypothesis. Complicating this examination is the huge time difference between the Huahine and New Zealand barkcloth beaters, paralleling the similar problem wherein ancient Huahine 'patu' clubs can only be compared with late classic Maori patu since no fighting clubs have ever been recovered from any New Zealand archaic sites.

Photographs and information on the barkcloth beaters from the Vaito'otia/Fa'ahia site and permission to publish them have very kindly been supplied by Dr Y. Sinoto (pers. comms. 24 August 1994, 26 October 1995). Sinoto reports that since 1977, a total of seven wooden barkcloth beaters have now been found during archaeological excavations at this site, six from the controlled excavations and one from dredging. However, because some of these have also been described elsewhere as plain wooden beaters and appear to be so from their photographs, the comparisons in this study will be restricted to those Huahine beaters which clearly qualify as barkcloth beaters on the criteria listed above.

The first barkcloth beater was found in 1977 in the stratigraphic excavation lying alongside a large flattish irregular-shaped stone which was therefore suspected to be a tapa

beating anvil (Sinoto 1979:6, Fig. 13a). Sinoto (1979:8) noted that this was the first wooden tapa beater ever found in a Society Islands settlement period archaeological site. A second beater was recovered by dredging from the small pond adjacent to the section of the site where the first beater was found and others were excavated during later seasons. Sinoto (pers. comm. 26 October 1995) has added that all of these Huahine barkcloth beaters have round to oval cross-sections with no examples of a square cross-section.

Huahine barkcloth beater D22-2 (Fig. 19)

This beater is described as having “vertical grooves and is 43 cm long and 6 cm in diameter at the beating section, with a reduced diameter in the handle” (Sinoto 1979:11). According to Sinoto’s correspondence, the cross-section is round. From its photograph, this beater is seen to have no obvious shoulder between beater portion and handle, and no enlargement at the butt.

Huahine barkcloth beater W41-4 (Fig. 20)

This tapa beater was found in 1984 in excavations on the opposite south side of the same small pond. Sinoto and Han (1985:16) have described it as follows:

“Round in cross-section, the beater is 360 mm long and 68 mm in diameter. The handle is slightly fluted, 29 mm in diameter. Grooves, 3 mm wide, run in a parallel pattern along the longitudinal axis of the beater.”

From its photograph, this beater is seen to be delicately-shaped with wide, scalloped grooves. There is no shoulder between beater portion and handle, but the handle is markedly reduced in diameter. The butt has a graceful flared enlargement.

Huahine barkcloth beater N43-25 (Fig. 21)

Also from the south side of the small pond, this barkcloth beater was excavated from Sinoto’s Layer V. He describes it as 370 mm long and 42-62 mm in diameter with a handle length of 190 mm (Sinoto, pers. comm. 26 October 1995). From its photograph, this beater has a small but definite shoulder between the beater portion and the handle. Damage to the handle has obscured the treatment of the butt although a strongly-reduced handle diameter is apparent. The longitudinal grooves are very regular and cut deep and sharp, in contrast to the broad grooves of the previous beater. The distal end terminates very abruptly with a slight regular convexity.

Huahine barkcloth beater #163 (Fig. 22)

Recovered as a surface find from dredged sands, Sinoto (pers. comm. 26 October 1995) is confident that this beater came from his Layer V. It measures 380 mm long and 70 mm in diameter. From its photograph, this beater shows a slight reduction in diameter towards the distal end, no shoulder between beater portion and handle, and a very slight flared enlargement at the butt. The longitudinal grooves are closely spaced and apparently quite shallow.

As a group in contrast to the New Zealand barkcloth beaters, these Huahine beaters display a fairly consistent form, marked by circular cross-sections with longitudinal grooving all around, little or no shoulder between beating portion and handle, minimal butt enlargement, and relatively fine shallow grooving. Beaters W41-4 and D22-2 vary from this norm in terms of the coarseness of their longitudinal grooves, especially W41-4 which has exceptionally wide grooves. Nevertheless, such variation in groove width is still normal within a range of tapa beaters from one cultural area.

For cultural reasons, these images have been removed.
Please contact Auckland Museum for more information.

Figs 19-22. Barkcloth beaters from the Vaito'otia/Fa'ahia site, Huahine Island, French Polynesia.
19. D22-2. 20. W41-4. 21. N43-25. 22. #163. Photos: Y. Sinoto, B.P. Bishop Museum, Honolulu.

While recognising the smallness of the sample, the Huahine beaters show much less diversity than the New Zealand beaters. Among the New Zealand beaters, only I, III and XI bear a superficial resemblance to the Huahine corpus, but this resemblance is negated by the total contrast in cross-section of the two groups. Obviously, the most noticeable contrast between the two sets of beaters is the exclusively round to oval cross-section of the Huahine beaters and the exclusively quadrangular or multifaceted cross-section of the New Zealand beaters. There are no quadrangular cross-sections among the Huahine beaters and no circular cross-sections among the New Zealand beaters.

Consequently, this mutually exclusive difference between the two sets of barkcloth

beaters does not provide any support for Sinoto's hypothesis of links of similarity between the material culture found in Huahine and New Zealand. However, in view of the time differential between these two assemblages, this difference in artefactual form does not disprove such a link when all the other possibilities of subsequent artefactual evolution and later introductions to New Zealand are considered.

NEW ZEALAND TECHNIQUES OF BARKCLOTH MANUFACTURE

Some very general inferences about the techniques of growing *Broussonetia papyrifera* and making barkcloth from its bark in New Zealand can be gleaned from the various types of information assembled in this study.

Cook, Banks, Parkinson and Colenso (C, D, E, and F above) all write about plantations of paper mulberry with at least six plants and perhaps more, indicating that the plant was carefully cultivated and protected as a crop in areas specially designated for this purpose. Buck (1924:28) quoted a report that the missionaries who arrived in Tahiti on the "Duff" in 1796 found that the paper mulberry cultivations had deep wide ditches dug around them to keep out the pigs. Such ditches would not have been necessary in pre-contact New Zealand without any large herbivores where light fences were sufficient to keep birds like pukeko out of cultivations. Writing generally of the Maori, Colenso (1868:10, 16) commented on the large amount of time and effort that had to be devoted to the cultivation of the main domestic plants, the kumara, taro, hue, and aute, each requiring a different soil. The aute, which was cultivated annually, required a rich soil but less intensive care than kumara and taro. In contrast to this indication of plantation cultivation of paper mulberry, at least one Maori proverb (Buck 1924:33) refers to the planting of a single paper mulberry tree beside a dwelling house. This practice has also been noticed in Western Samoa recently, where trees planted around the sides of the dwelling house provided enough bark for present reduced siapo manufacturing needs.

Banks made it very clear that the Maori in his time were not making large pieces of barkcloth, stating explicitly that; "we never saw peices [*sic*] of it larger than what served to put into the holes they bore in their ears, making an ornament they are very fond of" (Beaglehole 1962:II:9). Banks assumed that Maori made such small pieces because of the scarcity of the paper mulberry tree in New Zealand, but other traditional uses of barkcloth to be described below would indicate that Maori did have the technological knowledge to make larger pieces.

There is absolutely no evidence concerning the sort of barkcloth beating anvil that might have been used in New Zealand. Sinoto (1983:71) has reported a stone tapa beating anvil from the Vaito'otia/Fa'ahia archaeological site in Huahine, apparently identified as such mainly by its proximity to the find of a grooved wooden tapa beater. Kooijman (1972:105, 180, 199) and Tolstoy (1994) have noted the use of stone anvils in Hawaii, the Marquesas and Easter Island, perhaps significantly all eastern Polynesian cultures as is New Zealand Maori originally. Stone anvils would have survived in New Zealand archaeological sites but it is very doubtful if they would have been recognised as such. Judging from the preponderance of wooden beating anvils in most of Polynesia, including Hawaii and the Marquesas, the New Zealand Maori also probably used wooden anvils but again none have been recognised in the archaeological record.

Joseph Banks (Beaglehole 1962 II:9) made the definite observation that just as the tropical Polynesians beat the paper mulberry bark to make cloth, so did the New Zealand Maori "likewise beat it out into cloth". But sadly, neither Banks nor any others of Cook's company elaborated further on the beating process which they probably witnessed in New

Zealand. Nor apparently did they collect any Maori implements used in this process. One wonders whether perhaps some of the frequent early depictions of Maori women beating fernroot were actually mistaken from witnessing the beating of barkcloth. In either case, these depictions probably give a fair indication of how the barkcloth beating process looked to an outside observer.

With reference to the smooth surfaces on the two beaters from Whangarei, Buck (1924:38) suggested this indicated that New Zealand barkcloth was beaten very thin. Taking account of the function of smooth beater surfaces as known in the tropical Pacific Islands (Kooijman 1972:108, 352; Neich 1985:43), that is to flatten out the ridges left by grooved beater facets and to thin the cloth, the presence of smooth beating facets on New Zealand barkcloth beaters probably does indicate that they were used to produce a fine thin cloth.

On the basis of Buck's descriptions of the two barkcloth beaters from Whangarei, Kooijman (1972:93-94) surmised:

"The grooving of these beaters is rather fine, and they therefore resemble the central Polynesian type of *ike* and not the coarsely grooved beaters of Samoa and Tonga. In view of the relationship between the grooving of the beater and the quality of the finished product, it seems likely that the Maori produced a fine, thin tapa comparable to the kinds known from central Polynesia."

Unique among New Zealand barkcloth beaters, the diagonal pattern on the beater from Warea is reminiscent of the patterned tapa beaters from Hawaii (Kooijman 1972:108-109) which were designed to produce a watermark pattern in the finished cloth. Whether the Warea beater produced a similar type of watermark is open to conjecture.

Some very weak evidence for the way in which barkcloth was processed in New Zealand can be drawn from two proverbs recorded and explained by Colenso (1879:145). Both of these proverbs include the phrase "te aute tee whawhea" or "te aute tee awhea" which Colenso translated as "the prepared paper mulberry bark is not blown away (or disturbed) by the winds while drying and bleaching". While accepting that Colenso has clearly read more into these terms than any literal translation, it must be remembered that he may even have witnessed the process during his early days in the Bay of Islands, thereby prompting him to suggest that laying the beaten pieces out to dry and bleach in the sun might have been part of the barkcloth manufacturing process in New Zealand. Laying the beaten pieces of cloth out in the sun or in an open house to dry is a common step in the tapa preparation process in many tropical Pacific islands (Tolstoy 1994). In Savaii, Western Samoa, this stage of the process was observed in 1980 when small basalt lava stones were used as weights to hold the drying tapa in an extended spread and to stop the wind from disturbing the sheets (Neich 1985:48).

Except for the doubtful illustration in Thomas (1995), there is no evidence of pigment or coloured patterning being applied, from which it is assumed that New Zealand barkcloth retained its natural whitish colour. Supporting evidence for this is the Maori preference for very white Pacific island tapa cloth or even white paper in trade, reported by Banks during Cook's first contacts (Beaglehole 1962 I:442).

MAORI ARTEFACTS WITH BARKCLOTH INCORPORATED

A few rare Maori artefacts now in museum collections incorporate barkcloth into their construction. However, in view of the difficulties already noted for distinguishing *Hoheria* from *Broussonetia* barkcloth, and Pacific *Broussonetia* from New Zealand *Broussonetia* barkcloth, the relevance of this incorporated barkcloth is still problematical at present. Nevertheless, for the sake of completeness and for possible future reference, they are described here, as follows:

1. Feather cape with barkcloth backing

Listed as Number 304 in the Sir George Grey collection, this cape is now on deposit in Auckland Museum, registration number 1491. The total construction of this cape is non-traditional in technique and materials, constituting a probably unique artefact (Pendergrast 1987:113:no. 44). Tui tail feathers are attached in rows to a cloth foundation which in turn is backed with barkcloth, which Pendergrast considers to be possibly of eastern Polynesian origin. This tapa backing is a light brown colour, very thin and now brittle, with a very regular cross-hatched pattern of beater impressions on both sides of the cloth. No other provenance or historical information has been recorded for this cape.

2. Awl with barkcloth pad

Otago Museum number D33.1892f. Already described above as being found inside the waka huia from the confluence of the Talla Burn and the Clutha River, Otago, this wooden awl has a pad for protecting the user's hand at the proximal end. This pad consists of two layers of barkcloth, white barkcloth underneath and dark brown, almost red cloth wrapped over this.

3. Manutukutuku kite with barkcloth on facemask

Auckland Museum number 204. Made by a Maori person on the East Coast, Sir George Grey obtained this kite from Wiremu Kingi of Gisborne in 1886. Grey then presented it to Auckland Museum in the same year. The outer layer of the human face constructed on this kite consists of barkcloth moulded to fit the relief shape of the face. Barton (1987:69) who did the most recent conservation work on this kite was sure that this barkcloth was not beaten New Zealand ribbonwood or lacebark, but thought that it could quite possibly be a piece of Maori aute barkcloth beaten from New Zealand *Broussonetia papyrifera*. He did not explain how he distinguished these types of barkcloth. There is also another problem with Barton's suggestion of New Zealand *Broussonetia* being used here. If the kite was made in the mid-1880s, it is most unlikely that the barkcloth was made at that time also, in view of all the information available on the extinction of New Zealand *Broussonetia papyrifera* sometime soon after the 1840s. Perhaps some old New Zealand barkcloth was still available by 1885 but it is much more likely that tropical Pacific tapa cloth was used.

MAORI USES OF BARKCLOTH IN NEW ZEALAND

The presence of barkcloth in the artefacts described above already documents the Maori use of barkcloth in kites, as backing in a cloak, as wrapping for fragile and valuable objects such as huia feathers, as the lining of a treasure box, and as protective padding on a tool, in this case an awl. According to Skinner (1974:82), the pair of archaic chevroned pendants found in a hollow tree at Aniseed, Kaikoura were wrapped in a barkcloth package, but such a juxtaposition of archaic pendants in a late period wrapping raises some awkward questions.

Apart from these usages, by far the best documented Maori use of barkcloth is for decorative rolls worn through a hole pierced in the ear lobe. This usage was described several times by Cook and his colleagues during their first visit to New Zealand on the "Endeavour" (Beaglehole 1955:218; 1962 I:442; 1962 II:9). In fact, Sydney Parkinson's pencil sketches made on this voyage of Maori men wearing barkcloth rolls in their ears constitute the only indubitable visual evidence of what authentic New Zealand barkcloth actually looked like in use.

At Anaura Bay on 22 October 1769, Parkinson sketched two men with rolls of barkcloth through large holes in one of their ears, in both cases with a nephrite pendant hanging below

from the same ear (Joppien and Smith 1985:Illustration 1.107). Then at Queen Charlotte Sound in January 1770, Parkinson sketched three or four men with barkcloth rolls in an earlobe hole (Joppien and Smith 1985:Illustration 1.133). The details are a little unclear but some of these men also have a nephrite pendant suspended from the same ear below the barkcloth roll. At least one other has the barkcloth roll without the suspended pendant.

It is to be noted that only men were depicted wearing these rolls of barkcloth. Judging from the way the barkcloth rolls hold their shape and flare out in Parkinson's sketches, the cloth must have been fairly stiff. It also appears to be plain undecorated and probably white. This usage of barkcloth for ear rolls was the only use for barkcloth recorded in New Zealand during Cook's visits. On Cook's two later visits to New Zealand, locally-made barkcloth is not even mentioned in the journals; there is only one very oblique reference to rolls of cloth (probably Tahitian barkcloth) being worn in slits in ears, and no ear rolls are depicted by the artists on these later voyages. Does this mean that the wearing of barkcloth rolls in ears was only a very ephemeral fashion or was it simply not considered worthy of comment again in these later journals and visual records?

Observations made by the early French visitors to New Zealand add very little to the information recorded from Cook's voyages. Joseph Francois Raoul, chief quartermaster on the "Recherche" off North Cape and Cape Maria Van Diemen in March 1793 listed what he thought might be "material made of mulberry" among the items traded from Maori who came out in canoes (Ollivier 1986:49, 50). Raoul described this material as "ornaments which consist of little plaits of mulberry (?) passed through their ears". Charles Hector Jacquinot, an ensign on the "Coquille" at the Bay of Islands in April 1824 made the general observation that:

Men and women alike pierce their ears and by stretching them make holes that are often four or five *lines* [5/12 of an inch] in diameter. They put various objects through them such as pieces of cloth...

(Ollivier 1986:97)

It is interesting to note that Jacquinot implies that women also wore barkcloth rolls through their ears, contrary to the information conveyed by Cook and his colleagues that only men wore barkcloth ear rolls.

Visual records left by the artists on these early French voyages do not provide any further enlightenment. The only possible indication of barkcloth ear ornaments is seen in the portrait of a Maori man drawn by the artist Piron on board the "Recherche" off North Cape in March 1793. Unfortunately, Piron's original drawing is now lost, leaving only later engravings of this portrait for examination (Ollivier 1986:68-80). These show a large bundle of white fibrous strands hanging down below the man's shoulders from each ear. Because of his thick long hair and beard, the mode of attachment of these ornaments to his ears is unclear, although some versions might suggest that the bundles hang from perforated ear lobes. Collins and Ollivier (in Ollivier 1986:68, 69) have suggested that these ornaments might be narrow strips of tapa cloth, analogous to the "little plaits of mulberry passed through their ears" described by Raoul. Some of the engravings might suggest strips of cloth while others look more like finely plaited strands. If these bundles are indeed barkcloth, it is being worn in a totally different fashion to the small stiff barkcloth rolls through pierced ear lobes as described and drawn by Cook's colleagues.

Some later evidence of barkcloth rolls being worn by men in their perforated ear lobes is provided by the artist Augustus Earle in North Auckland in 1827 to 1828. In his sketches and watercolours (Murray-Oliver 1968:Plates 4, 12, 55), Earle shows men wearing large stiff rolls of white barkcloth, except for one man (Plates 28 and 39) whose ear ornament is a drooping piece of white material, which may or may not actually be barkcloth.

Williams's Maori dictionary (1971:137) gives "kope" and "turuki" as words meaning an "ear ornament made of aute". "Kope" is the word used in the traditional North Auckland account of Kahungunu's ear decoration of aute (T above). In the Marquesas Islands according to Handy (1923:289) identical rolls of white tapa cloth worn in the earlobes were called *koufau*. There they were said to be worn in order to keep the perforation of the earlobe distended. Whether or not this was the purpose of the ear rolls worn in New Zealand is now unknown, but they are generally assumed to have had a decorative function for their own sake, as supported by the comments of Banks and others on the value attached to barkcloth ear ornaments by their Maori acquaintances.

Both Maori and Pakeha commentators on the development of Maori clothing have often assumed that the earliest Maori settlers in New Zealand made or tried to make clothing from paper mulberry barkcloth, just as their forebears had done in the tropical Pacific. This is probably a reasonable and justifiable assumption in view of the fact that these first Polynesian settlers arrived into a cold climate from tropical islands where barkcloth clothing was possibly, but not necessarily, a part of the material culture. And they had brought the paper mulberry plant with them. However, there is no documented material evidence for this assumption, no evidence for how long the making of barkcloth garments might have persisted in New Zealand, and certainly no surviving New Zealand barkcloth garments. There are only the Maori oral traditions, which in this respect may be suspected of later elaboration. Thus, Patiki of Te Aupouri writing before 1851 stated:

"The clothing of the place from where we (our ancestors) sailed from on the "other side" was made of aute, a tree named aute, the bark of which was prepared,..."

(Simmons 1976:221)

Then bringing this knowledge to a New Zealand context, Himiona Tikitu of Ngati Awa related this comment in his account of a tribal battle that occurred about six generations before his time:

"Te Whatu-manu and Te Manawa were kept by Te Rangi-ka-wehea as beaters of aute, for that was the clothing of old, and these two were very clever at that work."

(Best 1898:653)

Similarly, Johannes Andersen (1907:322) claimed that:

"In ancient days, too, garments were made from the bark of the aute tree, such garments being called te kiri o Tane - the skin of Tane, lord of the forests."

These sorts of accounts were possibly stimulated by post-European contact acquaintance with the making of tapa clothing in the tropical Pacific islands. Best (1925a:3) also assumed that the early Polynesian settlers tried to make aute garments in New Zealand, and he then goes on to set up a conjectural evolutionary history in which aute garments are replaced by *Hoheria* bark cloth garments which in their turn were "soon to be abandoned for the more durable and satisfactory garments woven from *Phormium* fibre".

Buck (1924:33) was much more circumspect in his treatment of Maori traditional references to a maro aute in New Zealand. He felt justified to point out that the maro aute worn by Whakatau (Grey 1928:50) probably was truly a maro made from *Broussonetia* barkcloth since Whakatau lived in the Polynesian homeland before the move to New Zealand. At the least, Buck treated this reference as evidence for a Maori remembrance of the Polynesian barkcloth maro, noting at the same time that while the term "maro" was retained by the Maori, the material employed had changed to a plaited form. Consequently, he is sceptical of the mention of a New Zealand maro aute in the chant of Te Aratukutuku (Grey 1853:412).

Williams's dictionary (1971:183) gives "maro" as "a sort of kilt or apron worn by males and females", adding the remark that the maro might be made of various materials other than

aute. In this regard, Tregear (1891:34) lists “a girdle made of aute bark” as one meaning of “aute” but then goes on to list other meanings as “any article made of aute” such as a band or fillet for the hair, or a kite. In the description of Hinepoupou’s maro (Grey 1928:188) recorded by Hori Patara of Ngati Toa in 1851, the Rangitane narrator emphasized that the material was aute, even elaborating with poetic licence that the front of the maro was white and the back was red. In the myths of Maui and his mother Taranga, her maro are described as a maro-whaiapu (a superior maro made of dressed flax) and a maro-waero (made from the hair of a dog’s tail) (Grey 1854:16). The frequency of these detailed descriptions of maro in the traditions indicates that each particular type of maro communicates a strong symbolic significance. Consequently, it is to be expected that the descriptions of maro would continue to be elaborated for symbolic and literary reasons in the ongoing retelling of traditions, almost regardless of the actual clothing worn in the past.

Although with stronger justification, a very similar conjectural structure of assumptions has been built up around the other popular belief of aute usage, that Maori kites were originally made with *Broussonetia* barkcloth. This assumption is apparently based on traditional accounts of kites said to be made of aute barkcloth, such as the kite of Tawhaki on the string of which he climbed to heaven (White 1887:129), the kite of Tamapahore (Maysmor 1990:60-61) and the kite flown by the children of Onekawa pa at Ohiwa (Best 1925b:95), coupled with the later loose generic application of the words “manu aute” to mean a kite in Maori. It must be noted here that Best (1925:78) doubted if “manu aute” was ever used in a general sense or applied to kites made of any other material, contrary to Walsh’s (1912) title. Kites specified as made of raupo are equally common in these traditions. Nevertheless, these two views of Maori aute kites, one embodied in the oral traditions and another in the usage of the words “manu aute” seem to have been mutually supportive, so that the mention of a kite in a re-telling of a tradition about ancient times has then often been explained or glossed as referring to a kite made of aute. Kites made of aute are said to have been especially important for divination based on the kite’s movements during flight (Best 1925:73).

Thus, the most recent study of Maori kites, (Maysmor 1990:7) states; “The first kites made by the Maori in New Zealand were probably constructed in typical central Polynesian tradition, and as such may have been completely covered with aute cloth”. Indeed, kites covered with aute cloth are well attested, at least in historic times, in Hawaii, Tahiti, Marquesas and the Cook Islands, all Eastern Polynesian rather than central. Some commentators have surmised that in New Zealand the aute was woven or plaited, or wound around the body and wings of the kite, or laced on to the kite’s frame in narrow pieces.

It hardly needs comment that there is no material evidence for any of this in New Zealand kites, as Walsh admitted in 1912 (Walsh 1912:377). Indeed, out of seven surviving reasonably authentic Maori kites, only one has any barkcloth incorporated into its construction. This is the kite from the East Coast, now in Auckland Museum (AIM 204), discussed above. Even in this example, the barkcloth is only used as a face covering with no aerodynamic function, and even its identity as New Zealand *Broussonetia* barkcloth is uncertain. The oldest surviving Maori kite, that in the collection of the British Museum (Museum of Mankind 43.7-10.11) dating from 1843 has no barkcloth incorporated into its construction. All of the records of kites actually seen by early observers in New Zealand describe the covering materials as raupo, upoko tangata (or cutty grass), kiekie leaves and kuta leaves (Maysmor 1990:7-10).

In the same way that Best set up a conjectural history for aute garments, so did Walsh (1912:377) suggest a conjectural history for aute on kites, although he was aware of the speculative nature of this history. In Walsh’s scheme, the first kites constructed in New Zealand followed the old Polynesian model with aute in the form of barkcloth stretched on a

frame. Then because of the scarcity of aute, substitute coverings were found in the leaves of raupo or upoko tangata grass. But even in this later development in Walsh's conjectural evolution, the old connection with aute was maintained by making the head of the kite with aute cloth. This conjectured final stage of aute cloth use in kites was derived from the evidence of the sole example of the birdman kite in Auckland Museum. Then, in a final vestige of aute on Maori kites, strips of unbeaten *Broussonetia* inner bark were said to have been used in the same way as raupo leaves. This evolutionary relict was derived from Tutakangahau's account of kite-making in his grandparent's time (Best 1925:73).

Nevertheless, despite the scepticism expressed here, the general association of aute barkcloth with kite manufacture in New Zealand is very strong and can probably be accepted as reasonable evidence for some form of aute kites having been made in New Zealand at some unspecified period prior to European arrival. Mention of kites made of aute or at least incorporating some aute, by such authoritative Maori sources as Wi Maihi Te Rangikaheke of Te Arawa (Maysmor 1990:32) and Tutakangahau of Tuhoe, lend support to this association.

Buck (1924:40) makes the point that because of the limited supply of barkcloth in New Zealand and its association with the old homeland, "sentiment and scarcity increased the value of the prepared article" making it an appropriate vehicle for the wrappings around the emblems of gods and for the ornamental adornment of chiefs. Buck's point certainly seems valid when considering the range of *Broussonetia* barkcloth usages in New Zealand, although these types of usages are also probably those most likely to be remembered and recorded.

Several references describe the role of barkcloth in the ornamental adornment of high-ranking people, either in their ears, in their hair, on their person, or even perhaps on their symbols of authority. The evidence for ear rolls of barkcloth has been reviewed above, worn by men only, who were presumably of some degree of rank. Barkcloth worn in the hair has been mentioned frequently. Thus Colenso (1868:10; 1880:18) tells us that beaten *Broussonetia* barkcloth was made into "cloth-like fillets for the hair of the chiefs", probably to tie up their tikitiki or topknot. Percy Smith (in Brigham 1911:17) even describes Maori use of a fine gauze-like white piece of New Zealand *Broussonetia* barkcloth worn wound around the head in a turban form with flowing ends. Smith's description of this form of Maori dress is unsupported elsewhere and instead reminds one of the wearing of tapa cloth turbans by Fijian chiefs. In another unsupported reference, Riley (1994:121) describes an aute neck band used to bind around sweet-scented leaves, worn by chiefs and said to bring good luck in fishing and hunting. As a further extension of the association of aute cloth with chiefly rank, Riley (1994:121) mentions aute cloth being wrapped around a chief's "turupou or wooden staff of office".

With regard to the association of *Broussonetia* barkcloth with symbols of gods, Buck (1924:33) has asserted that "aute cloth was also used to wrap round the material representations of the gods in wood or stone". Buck then goes on to quote Gudgeon's (1885:171) description of the symbol for the god Ihungaru which was "formed of a lock of human hair twisted with rope of aute (paper mulberry bark)" as an example of the use of *Broussonetia* cloth in the actual material construction of a god. However, Ihungaru had been brought from Hawaiki. Probably related to this usage of aute cloth as a material symbol of a god is Goldie's 1905 account (Riley 1994:120) of a piece of aute cloth or perhaps unbeaten bark being ceremonially placed as a "waka atua", a vessel or material representation of a god, on the body of a seriously ill person. Similar religious sentiments are present in the reported use of *Broussonetia* barkcloth for swathing the dead (Simmons 1978:14), and in the use of aute cloth or perhaps the leaves, for wrapping the iho (umbilical cord of newborn babies) before hanging

it in a special hinau tree at Ohaua in the Urewera which was believed to have powers of aiding conception (Goldie 1904:95). When a Te Uri-o-Hau chief named Te Toko-o-te-rangi from Kaipara visited a priestess at Kaikohe to obtain an atua to aid his tribe against Ngapuhi he was given the symbol of this god in the form of a nephrite hei-tiki carefully wrapped in aute bark (Smith 1910:33).

Two other very doubtful usages of *Broussonetia* barkcloth should be mentioned for the record. Riley (1987:66) has quoted John White's description of greenstone anklets bound on the inside with aute cloth to protect the ankle from being bruised. Even more questionable is an account quoted by Best (1925c:289) describing how the awning on the Takitimu migratory canoe was constructed of an arched framework of rods bent over the hull and covered with woven mats or sheets of aute barkcloth.

Finally, Riley (1994:122) has listed various Maori medical usages of *Broussonetia* products, both as external bandages or gauze sponges and as an internal medicine.

CONCLUSION

In general, the evidence for New Zealand barkcloth manufacture and use is strongest in North Auckland and the Waikato, with subsidiary concentrations in Hauraki, central Bay of Plenty and the East Coast. The unique and untypical beater from Taranaki may document the extension of this technological complex into the colder southerly regions of the country or it may be a remnant of some other technology based on different plants. In a contradictory manner, the placename of Te Aute in Hawkes Bay appears to be evidence that the paper mulberry tree did not grow there. Even more puzzling is the restriction of finds of actual barkcloth to a very limited area of Otago, almost as far as possible from the northern regions of documented manufacture. Various suggestions of external importation, of manufacture from local trees, or of differential survival in a dry climate, cannot be proven or disproven at this stage.

This study has now produced a strange contradiction. On the one hand, much new evidence has been assembled on the frequency and wide geographical range of barkcloth manufacture in New Zealand. But on the other hand, it has led to a questioning of some of the accepted traditional uses for aute barkcloth. There is no doubt that at some time in New Zealand's prehistory, barkcloth was probably used much more widely than the limited sole usage as ear rolls seen by the first European visitors. Nevertheless, we need to be much more cautious in assuming what these wider usages might have been.

As it is most unlikely that any barkcloth or objects incorporating barkcloth will be found archaeologically, especially in the North Island which lacks the dry cave deposits of Otago, the only source of further information about traditional usages lies in very careful textual reading and criticism of the available Maori literary sources. The very limited critical textual study pursued above shows that for our purposes here, these Maori sources have many problems of re-interpretation, unacknowledged additions, and lack of historical context to show what influences have been at work on the production of each text. This is a normal feature of any active oral tradition adapting to new historical situations. At the very least, this study should have alerted readers to the presence of speculative historical reconstructions in much of the accepted writings about the use of barkcloth in pre-historic New Zealand.

Another major problem that has emerged is the present lack of any established techniques for distinguishing scientifically between New Zealand barkcloths made from the fibres of paper mulberry, the ribbonwoods and lacebark trees. As Gardner discovered, this will require detailed chemical analysis, a project for the future.

The detailed description and comparative analysis of the New Zealand barkcloth beaters has provided some indication of regional differences within this technological complex. These descriptions and analyses also provide a body of information for future archaeological comparison and culture history investigations, both within New Zealand and back into ancestral Polynesia.

Finally, whatever the details of its manufacture and use, this study confirms that *Broussonetia papyrifera* barkcloth in pre-European New Zealand was certainly an important, even if not a very plentiful, component of traditional Maori material culture.

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A NEW SPECIES OF *HALIOTIS* (MOLLUSCA) FROM THE EARLY MIOCENE BASAL WAITEMATA BEDS, RODNEY DISTRICT, NORTH AUCKLAND

MICHAEL K. EAGLE

Abstract. A new species, *Haliotis* (*Euhaliotis*) *mathesonensis*, is described from the early Miocene Kawau Subgroup, Mathesons Bay, Leigh, Rodney District. It is the first *Haliotis* species from New Zealand to be assigned to the subgenus *Euhaliotis*. It is the fourth fossil haliotid to be described from New Zealand and the third from the early Miocene.

Several trips to the coastline of Mathesons Bay, Leigh, between Cape Rodney in the north and Omaha in the south have yielded many varied and unusual macrofossils. A complete crystalline shell of a large prosobranch gastropod was collected on 15 February 1996 by the author from south Mathesons Bay whilst on an Auckland Institute and Museum field trip.

GEOLOGICAL SETTING (Fig. 1)

The abrupt lithofacies transitions apparent in early Miocene basal Waitemata strata (Cape Rodney Formation, Kawau Subgroup) at Mathesons Bay are a result of regional subsidence within a volcanic interarc basin. Variable lithologies, different biotopes and associated fossils, are due to eruptive periods in the peripheral volcanics, inconsistent sediment deposition and regional tectonism (Ricketts *et al.* 1989).

Transgression occurred over an irregular Mesozoic metagreywacke bedrock surface of the Waipapa Group (Hayward & Brook 1984), producing littoral, subtidal and shallow inner shelf deposits. Initial beach sands and gravels were re-deposited into deep water to be later overlain by extensive, laterally discontinuous, turbidite flysch (Ricketts *et al.* 1989; Hayward 1993).

SYSTEMATICS

CLASS: Gastropoda
SUBCLASS: PROSOBRANCHIA
ORDER: ARCHAEOGASTROPODA
SUPERFAMILY: PLEUROTOMARIACEA
FAMILY: HALIOTIDAE Rafinesque, 1815

GENUS: *Haliotis* Linnaeus, 1758
Type species: *Haliotis asinina* Linnaeus, 1758 (recent, Indo-Pacific by subsequent designation, Denys de Monfort 1810).

Shell auriform, depressed or inflated; asymmetrical with a low or pillar-raised spire situated more or less off-centre or sub-centrally posteriorly; concave ramp with spiral row of closed and open exhalant respiratory tremata along the left side; with or without rounded or flat, narrow to wide, carina at periphery; columella forming a wide, usually flat, ramp around the left side joins the basal lip, sometimes a flange; no operculum.

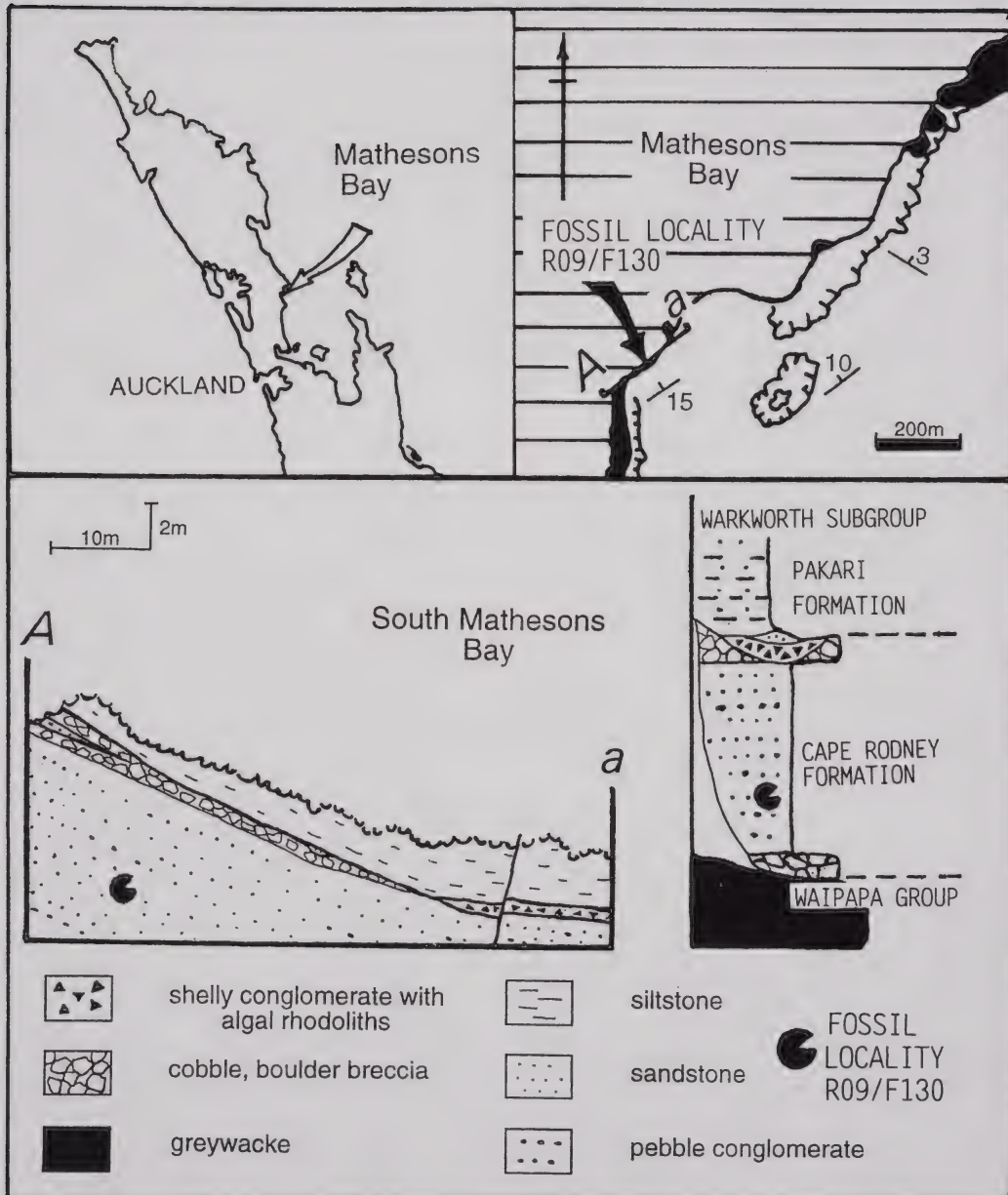


Fig. 1. Location map and geological stratigraphic column of South Mathesons Bay, Leigh, Rodney District, showing details of the early Miocene Kawau Subgroup fossil type locality R09/718428 (f130).

SUBGENUS: *Haliotis (Euhaliotis)* Wenz, 1938

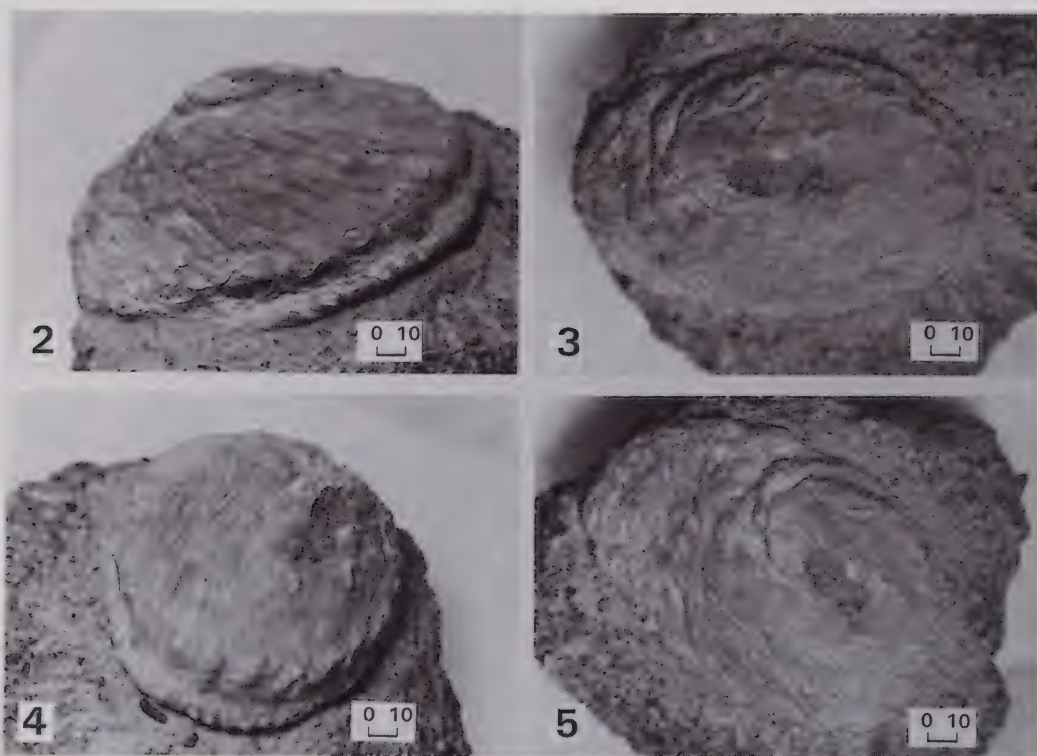
Type species: *Haliotis midae* Linnaeus, 1758 (by original description, Recent, East Asia, South America and South Africa).

Shell elongate, ovate; tremata on tubular projections situated on angulation separating upper whorl surface from flat or concave outer face; ornament of prominent wavy transverse growth lamellae oblique to collabral lines; labial area forming a projecting flange, outer edge of which forms shell periphery; last whorl within submarginal apex.

***Haliotis (Euhaliotis) mathesonensis* n. sp. (Figs 2-7)**

MATERIAL

Holotype. AK 72925 (Auckland Institute and Museum) collected on 15 February 1996; specimen matrix filled with crystalline calcite; shell complete except for spire.



Figs 2-5. Photographic views of the holotype of *Haliotis (Euhaliotis) mathesonensis* (AK 72925).
2. Postero-lateral. 3. Dorsal. 4. Posterior. 5. Oblique dorsal. Scale line = 10 mm.

TYPE LOCALITY

Fossil record file number RO9/f130 (Geological Society of New Zealand); grid reference R09/718 428 (1981, NZMS 260, 1:50 000 map), Mathesons Bay, Leigh, Rodney District, Auckland, New Zealand.

DESCRIPTION

Shell large, ovate, inflated; narrow, reduced columellar flange below missing apical spire; nucleus of spire remnant low, sub-central; protoconch not preserved, teleconch of about two whorls, obtusely angled below remnant spire nucleus middle; convex sutural whorl ramp joins narrow subvertical sided medial carina at the periphery; upper margin of thick outer lip, roundly notched; penultimate whorl coiled open spiral; last whorl with strong peribasal angulation; axial sculpture of well spaced, regular, prosocline plicae that become less distinct toward anterior outer lip; about 21 tremata extending from upper suture to whorl angulation on last whorl; 27+ total tremata, large, truncated conical; 11 tremata open; space between tremata concave, smooth; measurements of the holotype: diameter 136.5 mm; width 86 mm; height 85.3 mm.

The subcentral apex located midway of the shell diameter, lack of spiral cords, the large number of open tremata, vigorous growth at the anterior shell margin, possession of a thick roundly notched upper lip, no radial lirae, a reduced basal flange and a nominal axial sculpture solely of well spaced, regular, prosocline growth plicae that become less distinct toward the anterior outer lip, differentiate *H. (Euhaliotis) mathesonensis* from other fossil or Recent haliotids.

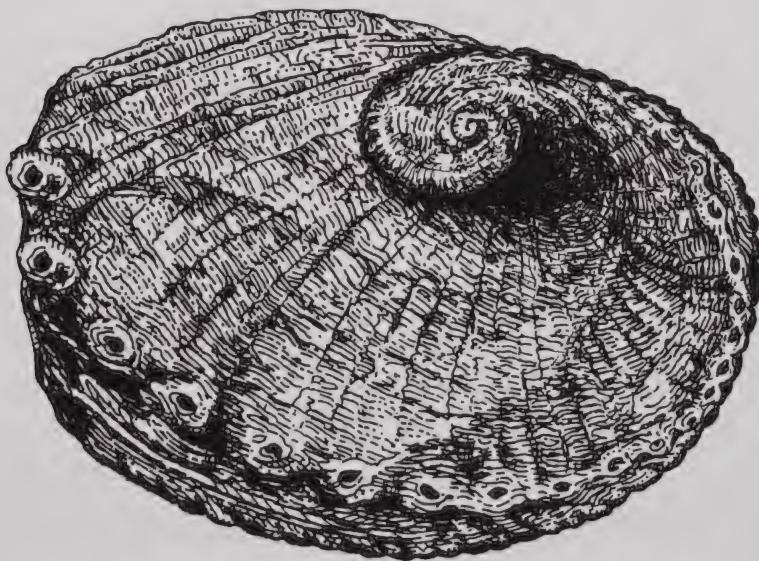


Fig. 6. Reconstruction of the shell of the holotype of *Haliotis (Euhaliotis) mathesonensis* (AK 72925).

AGE

Early Otaian (Po), early Miocene (Burdigalian).

ETYMOLOGY

Named after the type locality, Mathesons Bay.

DISCUSSION

The haliotids possess many characteristics considered by taxonomists as “primitive” (Abbott 1976; Abbott & Dance 1980). Haliotid ancestors are unknown. Some extinct taxa, such as the Triassic Temnotropidae, have auriform shells and possess haliotid-like characters. The early Mesozoic Trochotomidae also exhibit single tremata similar to the tremata characteristic of the Haliotidae today. However, it is uncertain whether a common ancestry or evolutionary convergence produced such similarities (Lindberg 1992).

Rocky shore facies and their fossils are rarely preserved due to the high energy of such biotopes (Lee *et al.* 1983; Beu *et al.* 1990; Eagle *et al.* 1995). Auriform haliotid shells are fragile. After death they are usually shattered by wave action or crushed by the tectonic effects of sediment deposition. Additionally, the aragonitic nacreous nature of the *Haliotis* shell, over time, delaminates and disintegrates. The result is a poor haliotid fossil record (Powell 1938).

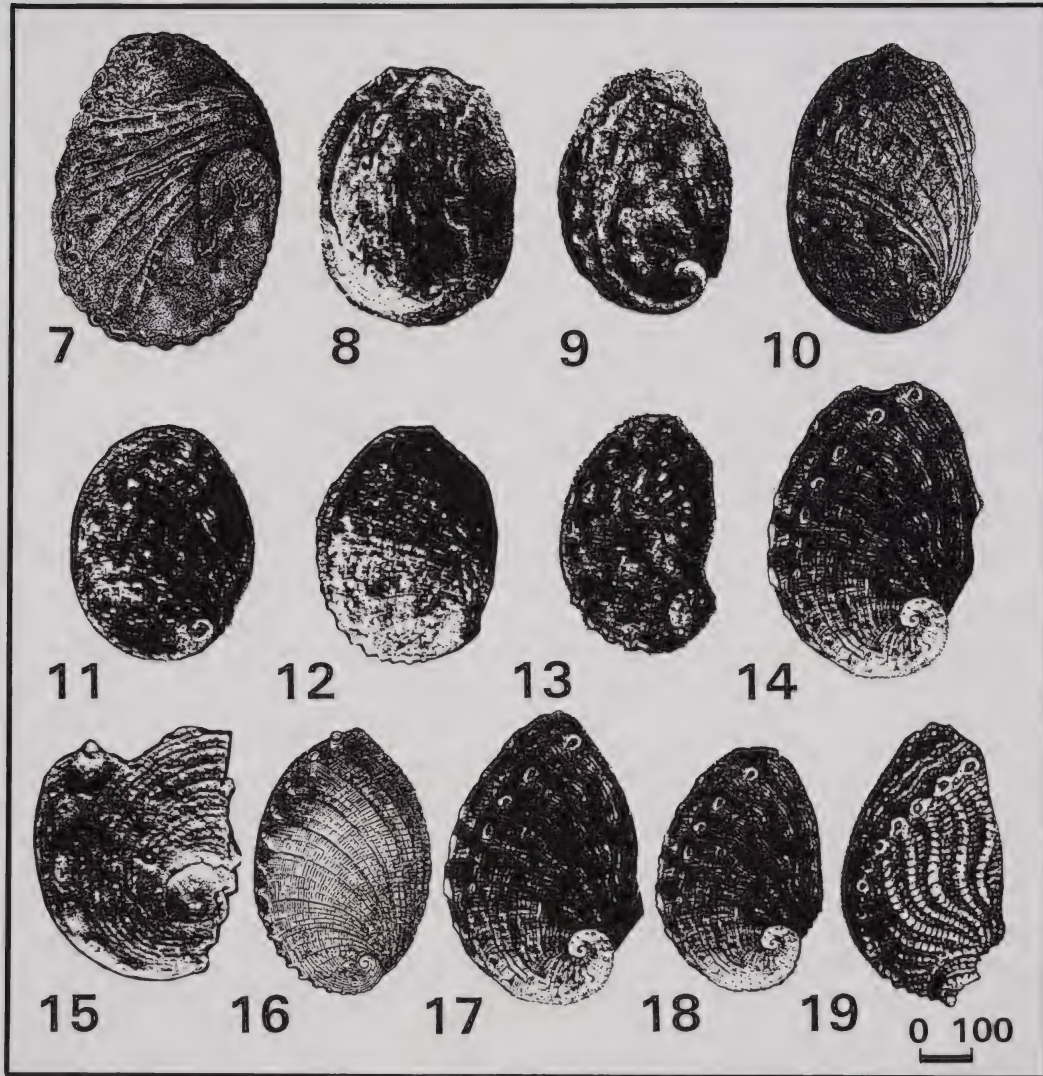
Various generic and sub-generic names have been proposed for the Haliotidae. Recent *Haliotis* (*Euhaliotis*) have an East Asian, African, and South American distribution. *H. (Euhaliotis) mathesonensis*, although very large, solid, with whorls very rapidly increasing, is not broadly ovate, and does not have as wide a columnar flange as does the subgenus *Paupa* (Fleming 1952). *H. (Euhaliotis) mathesonensis* is elongate, ovate but is not small to medium in size nor sculptured with dense spiral lirations or cords crossed by irregular transverse corrugations as are species of the subgenus *Sulculus* (Adams & Adams 1854). *H. (Euhaliotis) mathesonensis* is therefore unlike any Recent described New Zealand *Haliotis* subgenera. Although *H. (Euhaliotis) mathesonensis* has tremata on tubular projections, it cannot be assigned to the subgenus *Notohaliotis* as it does not have a raised or prominent dorsal rib or possess an ornament of spiral cords and threads crossed by irregular transverse ribs oblique to collabral lines (Cotton & Godfry 1933). Also, *H. (Euhaliotis) mathesonensis* is large, compact, orbicular-ovate in shell outline and, although having no spiral cord sculpturing, possesses body whorls that are depressed and rapidly growing, as does the subgenus *Euhaliotis* (Wenz 1938). *Haliotis* n. sp. is therefore assigned to *Euhaliotis*. This is the first record of the subgenus *H. (Euhaliotis)* for New Zealand. It has been necessary to compare a representative selection of both fossil and Recent *Haliotis* species to establish the validity of *H. (Euhaliotis) mathesonensis* as a new species. This has been undertaken on a geographic basis.

EUROPE

Because of doubtful assignation, the European Cretaceous species *Haliotis antiqua* and *Haliotis cretacea* are not compared with *Haliotis (Euhaliotis) mathesonensis*.

UNITED STATES OF AMERICA

A late Cretaceous (Maestrichtian) species, *Haliotis lomaensis* Anderson, 1902 (Fig. 8)



Figs 7-19. Drawings (dorsal view) of fossil and recent *Haliotis* for comparison with *Haliotis* (*Euhaliotis*) *mathesonensis* n. sp. (Fig. 7). Scalebar in millimetres. 7. *H. (Euhaliotis) mathesonensis*. 8. *H. lomaensis*. 9. *H. palaea*. 10. *H. lasia*. 11. *H. elsmerensis*. 12. *H. assimilis*. 13. *H. pourtalesi*. 14. *H. kamtschatkana*. 15. *H. santacruzensis*. 16. *H. kochibei*. 17. *H. kamtschatkana glabrosa*. 18. *H. kamtschatkana koyamai*. 19. *H. japonica*. [Figs 8, 15 from Durham (1979); Fig. 9 from Woodring (1931); Fig. 10 from Woodring (1932); Figs 12, 13 from Lindberg (1992); Fig. 14 after Talmadge (1963); Figs 7, 11, 16-19 by the author.]

(diameter 10 mm; width 10 mm), from Point Loma, San Diego County, California, has a slight whorl twist and a moderately well-defined spire and is similar to recent taxa. It differs from *Haliotis* (*Euhaliotis*) *mathesonensis* in having only slightly raised tremata, a wide flat basal flange, a smooth rounded medial carina and a low nucleus spire that is almost central.

All United States Miocene to Recent *Haliotis* species are from the Pacific Coast. The Californian early Miocene fossil *H. koticki* Hertlein, 1937 (diameter 102 mm; width 75 mm) differs from *H. (Euhaliotis) mathesonensis* in possessing spiral cords as well as radial lirae, the lip unites with a concave columella to form a suture which is angled, open tremata number only four, tremata form truncated-conical tubercles and the aperture is crenulate.

The holotype of the late Miocene *Haliotis palaea* Woodring, 1931 (Fig. 9) differs from *H. (Euhaliotis) mathesonensis* in being smaller (diameter 98 mm; width 70 mm), having a deep narrow groove between the exhalant tremata and shell edge, bearing an indeterminate number of open trema and having strong spiral cords intersecting crude wavy cords on the sutural ramp.

The holotype of the late Miocene *H. lasia* Woodring, 1932 (Fig. 10), from the conglomerate and sandstone Santa Margarita Formation, differs from *H. (Euhaliotis) mathesonensis* in being much smaller (diameter 75 mm; width 51.5 mm), having uniformly spaced spiral threads on the sutural ramp, having a relatively smooth shell exterior, having small, flat tremata that are not elevated (with only six open tremata) and in possessing an apical spire that is located more posteriorly.

The Pliocene *H. elsmerensis* (Fig. 11) from California is different from *H. (Euhaliotis) mathesonensis* in being larger (diameter 280 mm; width 200 mm), having only 3-4 open tremata, having a flatter sutural ramp and having the spire located subcentral posteriorly.

The Pliocene to Recent *H. assimilis* Dall, 1878 (Fig. 12) is of a similar size (diameter 130 mm) but differs from *H. (Euhaliotis) mathesonensis* in being auriform-oblong in shape, having a sinuous and undulating apertural lip, having only 4-5 open tremata and possessing a shallow groove on the external columella border.

The Pliocene to Recent *H. pourtalesi* Dall, 1881 (Fig. 13) differs from *H. (Euhaliotis) mathesonensis* in being extremely small (diameter 30 mm), having radial cords and possessing a posterior spire.

The Recent south-east Alaskan and North American *H. kamtschatkana* Jonas, 1845 (Fig. 14) although of a similar overall size (diameter 130 mm), differs from *H. (Euhaliotis) mathesonensis* in being auriform-oblong in shell outline with a particularly sinuous and undulating apertural lip. It has only four, rarely five, open tremata and possesses a shallow furrow on the external columella border.

GALÁPAGOS ISLANDS

The late Miocene fossil *H. santacruzensis* Durham, 1979 (Fig. 15) from Santa Cruz Island, Galápagos Islands, differs from *H. (Euhaliotis) mathesonensis* in having spiral cording, a distinct concave area below trematal angulation and is much smaller in size (diameter 12 mm).

NORTH-EAST ASIA

Many Miocene fossil *Haliotis* species have been described from Japan. *H. kochibeii* (Fig. 16) differs from *H. (Euhaliotis) mathesonensis* by being much larger (diameter 200 mm; width 124 mm), being more elongate-ovate and having a surface sculpture of spiral lirations



Figs 20-31. Drawings (dorsal view) of fossil and recent *Haliotis* for comparison with *Haliotis* (*Euhaliotis*) *mathesonensis* n. sp. (Fig. 7). Scalebar in millimetres. 20. *H. diversicolor*. 21. *H. (Euhaliotis) discus*. 22. *H. (Euhaliotis) sieboldi*. 23. *H. (Notohaliotis) waitemataensis*. 24. *H. (Paua) flemingi*. 25. *H. (Sulculus) powelli*. 26. *H. (?Notohaliotis) n. sp.* 27. *H. (Paua) iris*. 28. *H. (Sulculus) australis*. 29. *H. (Sulculus) virginea virginea*. 30. *H. (Euhaliotis) midae*. 31. *H. ovina*. [Figs 25, 26 from Beu *et al.* (1990); Fig. 27 from Morton & Miller (1968); Figs 21, 22 after Smith (1967); Figs 28, 29 from Suter (1915); Figs 30, 31 from Van Nostrand (1956); Figs 20, 23, 24 by the author.]

intersected by beaded radial cords. *H. kamtschatkana glabrosa* (Fig. 17) (diameter 120 mm; width 78 mm) and *H. kamtschatkana koyamai* (Fig. 18) (diameter 104 mm; width 73 mm) are different from *H. (Euhaliotis) mathesonensis* in being more obliquely-ovate, having a low spire posteriorly, possessing low, smooth tremata, and having only four open tremata. *H. japonica* (Fig. 19) (diameter 50 mm; width 37 mm), *H. kurosakiensis*, *H. notoensis*, the Pliocene *H. gigantoides*, *H. kokei* and the Pliocene and Pleistocene *H. diversicolor* (Fig. 20) (diameter 80 mm) all differ from *H. (Euhaliotis) mathesonensis* by being of a dissimilar shell outline, having less open tremata and possessing spiral lirae on the sutural ramp.

H. (Euhaliotis) mathesonensis is similar in shape to the common Recent Japanese, Korean and North Chinese *H. (Euhaliotis) discus* Reeve, 1846 (Fig. 21) but differs in being larger, having more open tremata (*H. (Euhaliotis) discus* has only four) and in having a thick, notched, upper lip. *H. (Euhaliotis) discus* possesses a spire that is more posterior than that of *H. (Euhaliotis) mathesonensis*.

The common Recent Japanese *H. (Euhaliotis) sieboldi* Reeve, 1846 (Fig. 22) (diameter 145 mm) is more rounded in shell shape than *H. (Euhaliotis) mathesonensis*, possesses flattened radial lirae on the sutural ramp, has only six open tremata, possesses a wide thin basal lip and has an apical spire that is located almost central, low posteriorly.

NEW ZEALAND

Because of the poor record, fossil *Haliotis* are rare (Woodring 1931). Only three extinct species of haliotids have been described from New Zealand, although several more species are known from isolated, undescribed specimens, or fragmentary material ranging in age from Mangaorapan (early Eocene) to Opoitian (early Pliocene) (Beu *et al.* 1990). The described, extinct species are: *Haliotis (Notohaliotis) waitemataensis* Powell, 1938 (early Miocene - Otaian stage; Fig. 23); *Haliotis (Paua) flemingi* Powell, 1938 (early Miocene - Otaian stage; Fig. 24); and *Haliotis (Sulculus) powelli* Fleming, 1952 (Pleistocene - Castlecliffian stage; Fig. 25).

A new undescribed species of *Haliotis* (?*Notohaliotis*) (Beu *et al.* 1990; Fig. 26) (diameter 90 mm; width 63 mm) from the Duntroonian/Waitakian Cookson Volcanics, South Island, differs from *Haliotis (Euhaliotis) mathesonensis* in having a prominent sculpture of spiral cords marking the keel on whorl sides and traversing the sutural ramp. Consequently, *H. (Euhaliotis) mathesonensis* does not possess the short, open spines or scales where spiral cords cross the axial plicae that *H. (?Notohaliotis) n. sp.* does. The smooth, moderately wide basal flange of *H. (?Notohaliotis) n. sp.* is lacking in *H. (Euhaliotis) mathesonensis* and is replaced by a robust, roundly notched upper margin of outer lip above a much reduced basal flange that is negligible in lateral extension. *H. (Euhaliotis) mathesonensis* appears unrelated to *H. (?Notohaliotis) n. sp.*

H. (Euhaliotis) mathesonensis joins *H. (Notohaliotis) waitemataensis* and *H. (Paua) flemingi* (type locality for both: Bostaquet Bay, Kawau Island, Hauraki Gulf, North Island) as the earliest geological occurrences of *Haliotis* described from New Zealand. *H. (Notohaliotis) waitemataensis* is much smaller (diameter 56 mm; width 46 mm) than *H. (Euhaliotis) mathesonensis*, more compact, orbicular-ovate in shell outline and the body whorls are depressed to a much greater extent. The shell of *H. (Euhaliotis) waitemataensis* has strong imbricating radial folds that are fewer and weaker in *H. (Euhaliotis) mathesonensis*. There is no spiral cord sculpturing on *H. (Euhaliotis) mathesonensis* as there is on *H. (Notohaliotis) waitemataensis*. Space between the tremata and the lower margin of the shell in *H. (Notohaliotis) waitemataensis* is, unlike *H. (Euhaliotis) mathesonensis*, spirally ribbed

instead of smooth. In *H. (Notohaliotis) waitemataensis*, tremata are tubular, number about 21 on the body whorl and are raised, but not as distinctly as in *H. (Euhaliotis) mathesonensis*.

H. (Paua) flemingi is also much smaller (diameter 78 mm; width 55 mm), depressed and less elongate-ovate than *H. (Euhaliotis) mathesonensis*. The irregular arcuate forwardly-directed radial folds are more frequent and more pronounced than those in *H. (Euhaliotis) mathesonensis*. The nucleus, at about one-third of the length from the left margin, is completely different from that of *H. (Euhaliotis) mathesonensis* which has a spire nucleus located subcentrally, left margin, at about half-way down the length of the holotype. The tremata are only slightly raised on *H. (Paua) flemingi* compared to the large, truncated conical tremata of *H. (Euhaliotis) mathesonensis*.

The imperfect internal cast described as *H. iris* Martyn, 1784 from Cape Rodney, North Island (Harris 1897; Suter 1913), is certainly not the Recent *H. (Paua) iris* Gmelin, 1791. The specimen, G.9549, in Sir James Hector's Collection, British Museum, could belong to any one of the three haliotids found fossil in the Otaian basal Waitemata Group lithofacies - *mathesonensis*, *waitemataensis* or *flemingi*.

The New Zealand Pliocene fossil (?Opoitian - Recent) *H. (Paua) iris* Gmelin, 1791 (Powell 1976; Fig. 27), although of similar size (diameter 117 mm; width 78 mm), is different from *H. (Euhaliotis) mathesonensis* in having a wide flat basal flange instead of a reduced, minimal one; in possessing a smooth rounded, instead of notched medial carina; in having smaller tremata that are not as raised; and in possessing a low spiral nucleus apex that is located left of centre, posteriorly and not sub-centrally, mid-length as in *H. (Euhaliotis) mathesonensis*.

H. (Euhaliotis) mathesonensis is larger, more inflated and more elongate-oval than New Zealand Pleistocene and Recent fossil species. The apex is more central than in *H. (Sulculus) australis* Gmelin, 1791 (Haweran stage - Recent; Fig. 28) (diameter 82 mm; width 73 mm), *H. (Sulculus) virginea virginea* Gmelin, 1791 (Haweran stage - Recent; Fig. 29) (diameter 50 mm; width 36 mm), *H. (Sulculus) virginea crispata* Gould, 1847 (Haweran stage - Recent), *H. (Sulculus) virginea huttoni* Filhol, 1880 (Recent) and *H. (Sulculus) virginea morioria* Powell, 1938 (Recent).

The New Zealand Pleistocene (Putikian geologic substage) fossil *H. (Sulculus) powelli* Fleming, 1952 (type locality - Ohope Beach, Whakatane, North Island), compared to *H. (Euhaliotis) mathesonensis* is much smaller (diameter 47 mm; width 30.5 mm), less inflated, possesses an extremely large, depressed last whorl instead of an inflated one, has a low spiral apex located posteriorly, not sub-centrally, has four open exhalant tremata near the narrower columnar lip and is more coarsely sculptured. Closed tremata form a spiral row of low nodes in *H. (Sulculus) powelli*, whereas *H. (Euhaliotis) mathesonensis* has 11 open tremata which are swollen truncated conical and also form a spiral row. *H. (Euhaliotis) mathesonensis* has no rounded spiral costae like *H. (Sulculus) powelli*, only prominent growth ridges. Unlike *H. (Euhaliotis) mathesonensis*, *H. (Sulculus) powelli* has both inner and outer lips arched gently above the plane of the mollusc's foot.

NEW CALEDONIA

An undescribed leached limestone cast of a fossil *Haliotis* sp. indet. from the early to middle Miocene (Otaian - Kapitean geological stages) of New Caledonia (University of Auckland, Geology Department Collection) differs from *H. (Euhaliotis) mathesonensis* in having the apical spire subcentral posteriorly. Because it is an internal cast, the specimen is without sufficient detail for external shell comparison.

SOUTH AFRICA

The tectonically raised Tertiary beaches of the west coast of South Africa yield molluscan fossils representative of a warm water fauna (Bardnard 1953), as are the specimens from Mathesons Bay. Pleistocene to Recent haliotids include the very large *H. (Euhaliotis) midae* Linnaeus, 1758 (Fig. 30) (diameter 170 mm; width 141 mm). *H. (Euhaliotis) midae* is distinguished from *H. (Euhaliotis) mathesonensis* by corrugations running obliquely to those of the growth lines, by being more ovate than elongate-ovate and by having a low spiral apex situated sub-centrally a quarter of the way along the specimen. Of all the haliotid species compared with *H. (Euhaliotis) mathesonensis*, the extant *H. (Euhaliotis) midae* is morphologically the most similar.

AUSTRALIA

At least 23 described Recent species (Wilson *et al.* 1993) and various fossil species (Darragh 1970) of *Haliotis* occur in Australia. All of these except *H. ovina*, however, are assigned to different subgenera and so are not compared with *H. (Euhaliotis) mathesonensis*.

H. ovina Gmelin, 1791 (Fig. 31) is different from *H. (Euhaliotis) mathesonensis* in being much smaller (diameter 40 mm), having a thin shell with a low dorsal surface, being sculptured with weak spiral striae and low rounded axial folds sometimes forming rows of nodules, having only four open tremata and having a shallow depression between the holes and the tremata and several narrow ribs near the shell margin.

ANCESTRAL ORIGINS

Phylogenetic precursors of *Haliotis* have been historically attributed to the Indo-Pacific area, however, fossil discoveries along with Recent distribution and speciation models do not support this. It is more probable that a Tethys Sea/ Panthalasia Ocean Mesozoic migratory pathway facilitated a Cenozoic Gondwanan relationship between African, American, Southern European, East Asian, Australian, and New Zealand *Haliotis* species. It is suggested that subsequent Tertiary radiation or convergence within preferred ecological niches has produced species variation and form. Morphological aspects of *H. (Euhaliotis) mathesonensis* are apparent in many other southern hemisphere species. Because of the early Miocene age of the new species, it is proposed that, along with Australian fossil species of the same age, broadcast young of *H. (Euhaliotis) mathesonensis* were paleo-distributed through time by the Antarctic circumpolar current from perhaps the late Oligocene (when unobstructed circumpolar passage originated) onwards. This process facilitated the phylogenetic radiation of *Haliotis* and influenced its Tertiary distribution.

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SEVEN NEW SPECIES OF *CLIMOCELLA* (GASTROPODA: PUNCTOIDEA: CHAROPIDAE) FROM NORTHERN NEW ZEALAND

J.F. GOULSTONE

Abstract. Seven new species in the charopid genus *Climocella* Goulstone, 1996 are described from the North Island: *Climocella barkeri*, *C. intermedia*, *C. isolata*, *C. waenga* from the East Cape area, *C. mayhillae* from mid Northland, and *C. reinga* and *C. runga* from the Te Pahi area.

In 1992 and 1993 P.C. Mayhill and G.M. Barker surveyed landsnail populations as part of a wider Landcare Research ecological study of the Pukeamaru Ecological District, East Cape. The *Climocella* Goulstone, 1996 material from these collections was given to Auckland Museum. This material consisted of many empty shells from various locations and seven preserved animals from four locations. Additional East Cape shells were also studied from existing Auckland Museum and Museum of New Zealand collections. At first inspection all but three or four shells belonged to the colour patterned group of *Climocella* and, though there were some variations, all were assigned to *Climocella akarana* Goulstone, 1966. The three or four exceptions were unicoloured and belonged to an undescribed species allied to *Climocella kaitaka* Goulstone, 1996. However, dissection of the preserved animals revealed a far from simple situation among the group of patterned shells and it became difficult to view them as one variable species. Seven dissections provided five distinct configurations of genitalia, one of which corresponded to the description of *C. akarana* given by Goulstone (1996) (Te Koau, 2.2 mm. x 1.2 mm, G.B. 24/9/92, AK152164). On re-examination of the fragments of shell from the dissected specimens, linked to whole empty shells from the same sites, three stood out as morphologically separate from *C. akarana*. One additional specimen could be separated from *C. akarana* only with high magnification examination of the conchological features especially the protoconch. These findings, matching features of the shell with that of anatomy, formed the basis of recognition of distinct species amongst the larger collections of empty shell material and their description in this paper. Preserved material is relatively rare in collections and anatomical study of more specimens will no doubt elucidate patterns of anatomical variation within and between *Climocella* species, but for this paper I have separated the material on the basis of the observed anatomical and shell differences.

I have also described a mid Northland unicoloured species from two live specimens and several shells given me by P.C. Mayhill and one shell from F.J. Brook. I have described two northernmost Northland species from preserved material supplied by the Museum of New Zealand, live collected by B.F. Hazelwood and O.J. Marston and many contemporary and subfossil shells in museum collections. One of the latter species was partly illustrated by Climo (1969).

The taxon descriptions and distributions given in this paper are based on specimens held in the Auckland Museum (lot numbers preceded by "AK") and the Museum of New Zealand (lot numbers preceded by "M."). Dissected animal material has been preserved but shell pieces were discarded. For type material the number of specimens is given in parentheses following the accession number. Right hand (R.H.), left hand (L.H.) appearing in the

illustrations refer to the direction of snail locomotion. Collector names, which appear often in the distribution records, are referred to by the following initials: P. Anderson, G. Carlin and C. Ogle (A.-C.-O.), G.M. Barker (G.B.), F.J. Brook (F.B.), F.M. Climo (F.C.), J.F. Goulstone (J.G.), B.F. Hazelwood (B.H.), P.C. Mayhill (P.M.), G.R. Parrish (R.P.), D.J. Roscoe (D.R.). Colours are based on "Ridgways Colour Standards and Nomenclature, 1912" (R.C.S.). Map references are from the N.Z.M.S. 260 series and all dates refer to the 20th century. New Zealand Archaeological Association site record numbers (records with N2/ and N3/ prefixes) and Geological Society of New Zealand fossil record numbers (M02/f prefix) are listed for collections of subfossil specimens.

SYSTEMATICS

SUPERFAMILY: PUNCTOIDEA Morse, 1864.

FAMILY: CHAROPIDAE Hutton, 1884.

GENUS: *CLIMOCELLA* Goulstone, 1996

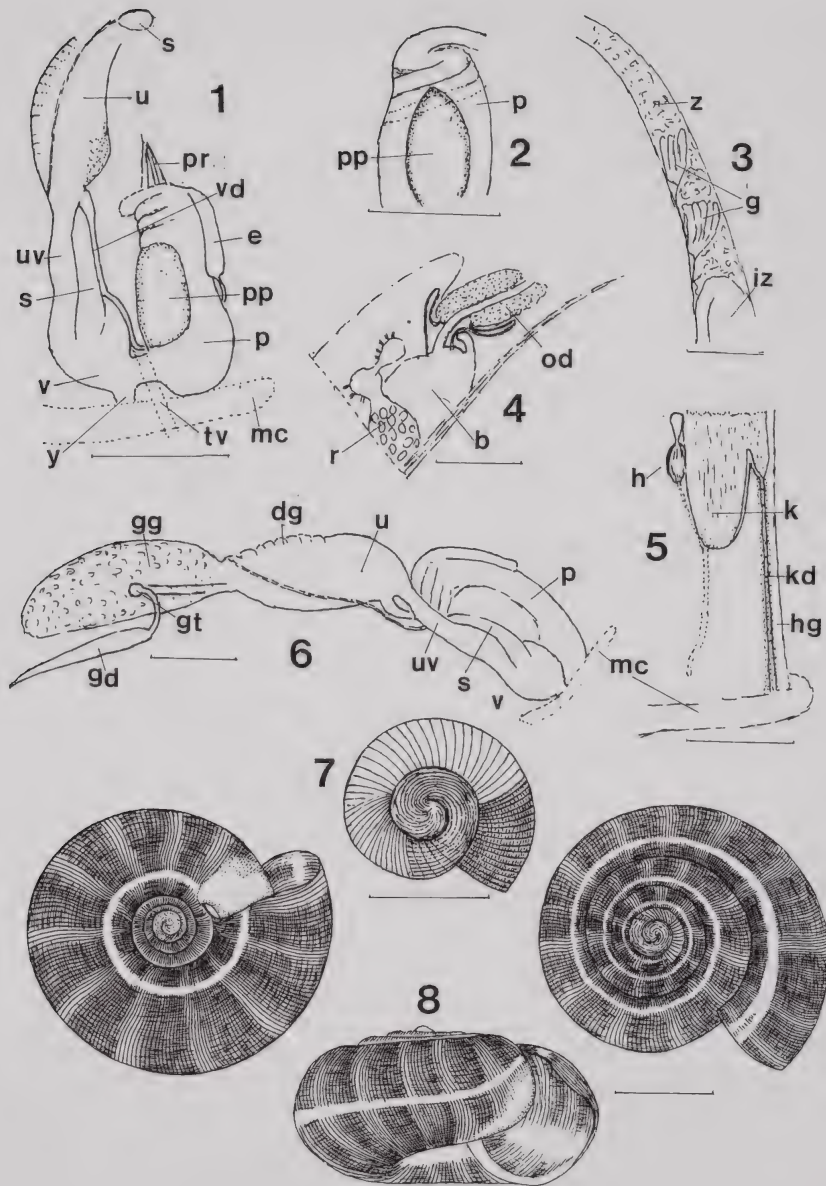
Climocella barkeri n. sp. Figs 1-8, 57

ETYMOLOGY: Named for Gary Barker.

DESCRIPTION

Shell small (up to 2.7 mm x 1.4 mm), subdiscoidal, four and a quarter whorls, first two narrow, last somewhat inflated (0.8 mm, nearly one third of diameter). Spire flat or slightly raised, umbilicus one quarter shell width. Protoconch one and three quarter whorls, first whorl with nine spiral lirae, second quarter with fine crowded oblique axials, third half having less oblique more distant axials (40 per mm). Teleoconch whorls have close axial ribs (95 per mm on first, 31 per mm on the last whorl) with three or four very fine secondary axials between. These axials, emerging at right angles from a moderately deep suture, are slightly sinuous. The whole surface is overlaid with fine close microscopic spiral lirae. Colour consists of indistinct, broad, radial bands of sepia (pl.29 17m R.C.S.) against a cartridge buff (pl.30 19f R.C.S.) background, the markings quite faint on base. (This description is of the holotype.)

Ovotestis comprising two clusters of alveoli (0.35 mm & 0.27 mm), with digestive gland tissue between, extending from just beyond apex of stomach and start of intestine. Hermaphrodite duct emerging as a fine tube from ovotestis, with enlarged medial section (0.8 mm long) slowly widening then abruptly narrowing for a short section before entering albumen gland. Albumen gland under loops of intestine has talon (0.2 mm diameter) imbedded near centre and spermathecal sac touching distal edge. Spermoviduct oval (1 mm long) with prostatic portion on proximal section, narrows to oviduct (0.6 mm long). Vagina bulbous (c. 0.5 mm x 0.5 mm). Spermathecal duct long, its widened base arising from the vagina is same length and width as oviduct, its greater distal length adjacent to spermoviduct very slender terminating in small spheroidal reservoir. Penis in proximal part rectangular in outline, broad (1.5 mm x 0.6 mm), extending distally as a narrowed tube to atrium. Epiphallus a straight tube (about 0.7 mm long) external to penis, in distal part apparently as coils fused to apex of penis. Retractor muscle attached apically to these coils. Penis has internal, solid, tear shaped stimulatory organ, clearly visible through the walls. Kidney bilobed, that lobe abutting rectum small. Some scattered black pigment on pallial membrane along length of ureter. White stringy pigmentation along



Figs 1-8. Shell and anatomy of *Climocella barkeri* n. sp. Scale lines 1,2,5,8 = 1 mm, 3,4,6,7 = 0.5 mm. Abbreviations: b - buccal mass, be - oesophagus, dg - prostatic gland, e - epiphallus, ep - pore from epiphallus into penis, g - ovotestis, gd - hermaphrodite duct, gg - albumen gland, gt - talon, h - heart, hg - hindgut, i - intestine, iz - stomach, k - kidney, kd - ureter, mc - mantle collar, og - salivary glands, od - salivary ducts, p - penis, pi - pigmentation, pp - penis pilaster or stimulator, pr - penis retractor muscle, r - ganglia, s - spermathecal shaft and its sac, u - spermoviduct, tv - rhinophoral tentacle, uv - free oviduct, v - vagina, vd - vas deferens, y - genital atrium, z - digestive gland. 1. Terminal genitalia. 2. Penis. 3. Digestive gland and ovotestis. 4. Salivary glands, buccal mass and ganglia. 5. Pallial cavity and kidney. 6. R.H. view of genitalia. 7, 8. Shell and protoconch of holotype (AK72891).

length of stomach. (Anatomy based on one dissection from the East Cape Lighthouse Reserve, 2.8 mm x 1.4 mm, G.B. 20/9/92, AK152165.)

REMARKS

The narrow first initial whorls, with the inflated final whorl distinguish this species. Even juveniles of three whorls showed this feature. A dissected juvenile specimen from Mt. Hikurangi Hut (2.2 mm x 1.3 mm, P. Poortman 8/4/96 AK152166) had not developed sufficient recognisable genitalia.

TYPE LOCALITY: East Cape Lighthouse Reserve, Z14 992754.

HOLOTYPE: Auckland Museum AK72891, 2.7 mm x 1.4 mm., G.B. 20/9/92.

PARATYPES: All from type locality. AK72892, G.B. 20/9/92 (1 ad., 2 juv.); AK72893 in manuka and flax litter, G.B. 20/9/92 (1 ad., 4 juv.); AK72937, P.M. 1/6/96 (7); M.129901, G.B. 20/9/92 (2 ad., 4 juv.).

OTHER MATERIAL EXAMINED

Anaura Bay Z16 743163, P.M. 1/4/94, AK151757. East Cape Z14 991754, P.M. 1/10/82, AK151792; Z14 991752, L. Daniel 1/1/85, M.76364, M.76398. Hicks Bay Z14 774900, P.M. 1/3/93, AK151749; Z14 777867, P.M. 1/12/77, AK151885. Hikurangi Hut Y15 547538, P.M. 1/12/80, AK151802, M.76802. Kopuapounamu Valley Z14 815781, F.C. 19/5/83, M.78033. Maungamauku Z14 817741, F.C. 19/5/83, M.78301. Papatea Y14 385806, G.B. 14/9/92, AK151778. Rangiata Z14 762986, G.B. 20/9/92, AK151774. Rereauria Y14 582906, G.B. 20/9/92, AK151777. Taikawakawa Z14 931806, G.B. 21/9/92, AK151775. Te Araroa Z14 852828, P.M. 1/2/81, AK151760; Z14 790857, D.R. 28/12/79, M.102976. Te Kaha X14 290713, P.M. 1/7/86, AK151913. Te Koau Z14 778864, P.M. 1/3/93, AK151807; Z14 778862, G.B. 23/9/92, AK151776. Tikitiki Z14 937707, D.J.R. 8/7/78, M.104105. Waenga: Y14 653913, P.M. 1/9/92, AK151828; Y14 652913, G.B. 16/9/92, AK151773. Waiaroho: Y14 656865, P.M. 1/3/93, AK151772; Y14 651866, P.M. 1/9/92, AK151764.

DISTRIBUTION AND HABITAT

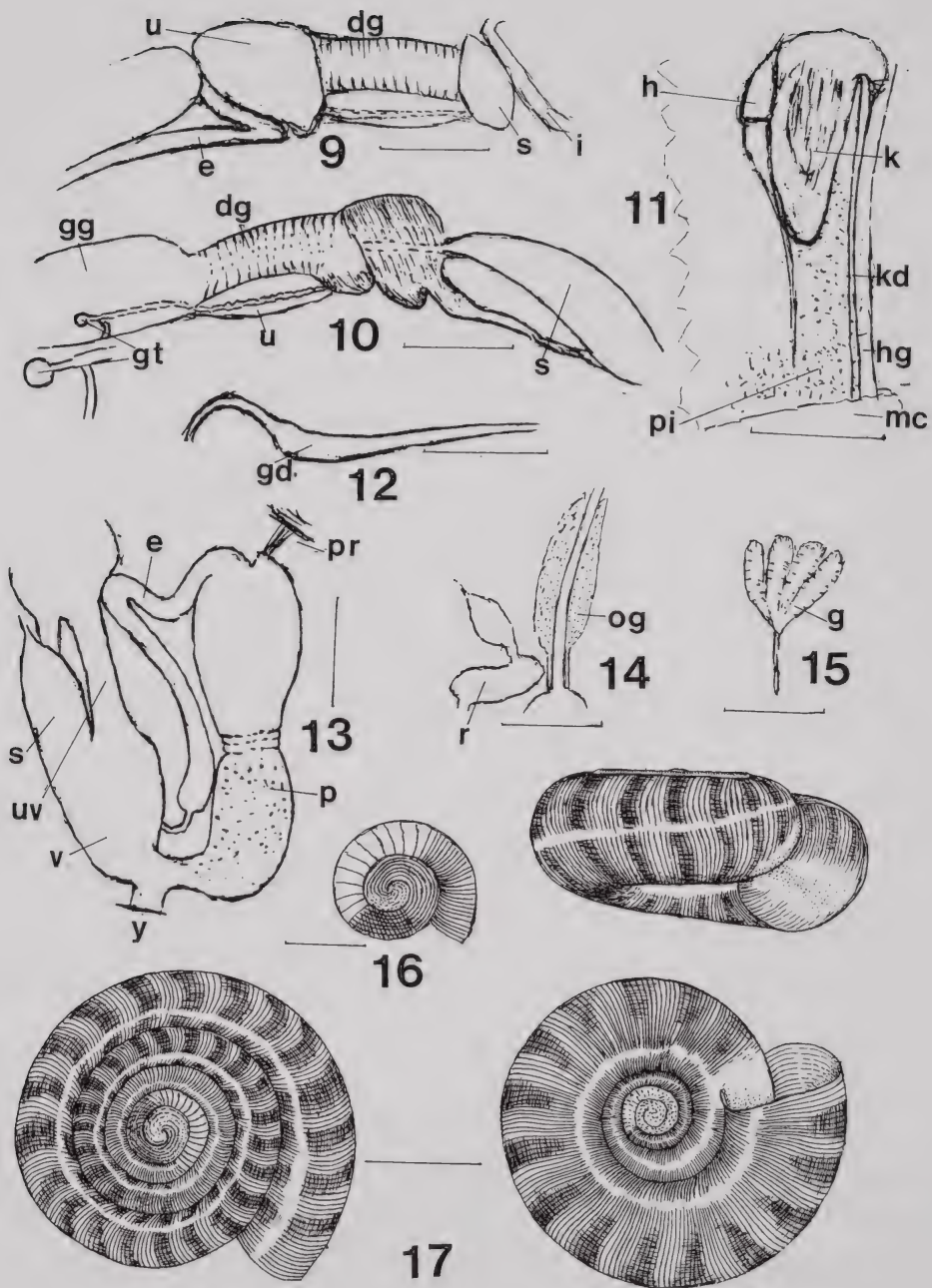
Known from a number of sites between Papatea in the west to East Cape, and also south to Hikurangi and Anaura Bay. Generally found in forest but at the East Cape Lighthouse Reserve occurs in scrubby open conditions in native grasses and fine sedge (P.M., pers. comm.).

Climocella intermedia n. sp. Figs 9-17, 57

ETYMOLOGY: This snail appears intermediate between *C. akarana* and *C. waenga*.

DESCRIPTION

Shell small (up to 2.7 mm x 1.3 mm), subdiscoidal, four and a quarter regularly increasing whorls (final whorl between a quarter and a fifth of diameter). Spire flat or slightly sunken, umbilicus just less than one third diameter. Protoconch one and three quarter whorls; first whorl with eight spiral lirae; second quarter of protoconch with about 12 crowded oblique



Figs 9-17. Shell and anatomy of *Climocella intermedia* n. sp. Scale lines 11, 17 = 1 mm, 9, 10, 12-16 = 0.5 mm. Abbreviations as for Figs 1-8. 9. L.H. view spermoviduct with position of spermathecal sac. 10. R.H. view of spermoviduct, albumen gland and talon. 11. Pallial cavity and kidney. 12. Hermaphrodite duct. 13. Terminal genitalia. 14. Salivary glands. 15. Ovotestis. 16, 17. Shell and protoconch of holotype (AK72894).

radials over the eight spirals; third half with quite wide straight axials (42 per mm) without spirals. Teleoconch whorls have close axial ribs (85 on first 27 per mm on last whorl) with three very fine secondary axials between. Ribs slightly oblique from moderately deep suture, forward in direction of growth. Teleoconch with fine, close microscopic spirals, more prominent than secondary axials in the interstices. Colour consists of narrow radial bands of amber brown (pl.3 13k R.C.S.) on a cartridge buff (pl.30 19f R.C.S.) background, more prominent on outer whorls and proceeding over base to umbilicus. (Description based on holotype.)

Ovotestis comprising two clusters of alveoli with digestive gland tissue between extending from just beyond apex of stomach and start of intestine. Hermaphrodite duct a fine tube arising from ovotestis, with enlarged tapered medial section (1 mm long), reducing sharply to short narrow tube terminating in carrefour with diverticulate talon (0.1 mm diam.) partially embedded in albumen gland. Albumen gland under loops of intestine. Spermoviduct, elongate (1.1 mm long) with prostatic portion (0.6 mm long) in proximal section, narrows to free oviduct (0.7 mm long). Vagina bulbous (0.7 mm long). Spermathecal duct, with thicker base same length as free oviduct but twice as wide, narrowing to very slender distal section running adjacent to spermoviduct to terminate in spermathecal reservoir sac lying beside albumen gland. Epiphallus long (1.25 times penis length), folded in retracted position. Penial retractor muscle inserted on proximal apex of penis adjacent to epiphallus entry. Penis, oval shaped (1.6 mm long) with restricting rings near middle; proximal portion thick and opaque, distal portion translucent, narrowed to atrium. Kidney weakly bilobed the limb adjacent to rectum very small. Outside wall of pallial cavity has speckled black pigmentation, broad at mantle collar, narrowing along line of ureter. (Anatomy based on one specimen from Papatea, 2.75 mm x 1.4 mm, G.B. 14/9/92, AK152167.)

REMARKS

This species closely resembles the variable *C. akarana* in shell features, particularly *C. akarana* from Auckland. Shells of East Cape *C. akarana* are always slightly domed with crowded oblique protoconch radials merging straight into true teleoconch axials, whereas *C. intermedia* has a flat or slightly depressed spire and the addition of straight widely spaced axials on the protoconch. Strong differences in terminal genitalia also separate *C. intermedia*.

TYPE LOCALITY: Papatea Y14 385807, 60 m.

HOLOTYPE: Auckland Museum AK72894, 2.65 mm x 1.25 mm, P.M. 1/9/92.

PARATYPES: All from type locality. AK72895, P.M. 1/3/93 (5 ad., 5 juv.); M.129902, P.M. 1/9/92 (6 ad., 4 juv.).

OTHER MATERIAL EXAMINED

Motu R. X15, A.E. Brookes, AK85669; X15 165607, P.M. 1/12/80, AK151804; X15 177607, P.M. 1/12/80, AK151819. Ohinepoutea St. Y15 585596, F.C. 12/5/83, M.78250. Papatea Y14 385807, P.M. 1/3/93, AK151751; P.M. 1/9/92, AK151746. Raukokore Y14 405837, D.R. 10/7/78, M.104021. Te Kaha X14 266735, P.M. 1/10/82, M.76841; 1/7/86, M.87641; X14 290713, P.M. 1/7/86, AK151912. Te Puia Y14 483819, P.M. 1/3/93, AK151801. Waihau Bay Y14 440860, A.W.B. Powell 1/8/33, AK85607. Waiotahi R. W16 761289, L. Daniel 1/1/85, M.82499.

DISTRIBUTION AND HABITAT

C. intermedia is plentiful at some eastern Bay of Plenty forest sites and also occurs in forest at the end of the Mt. Hikurangi road. Its present known western limit is at Waiotahi River west of Opotiki. Although it is sympatric with *C. barkeri* at several sites it did not overlap with *C. waenga*. Found in fine friable soil under fallen logs and in crevices in bark on fallen logs (P.M., pers. comm.).

***Climocella isolata* n. sp. Figs 18-25, 57**

ETYMOLOGY: On present evidence this snail appears isolated around the East Cape.

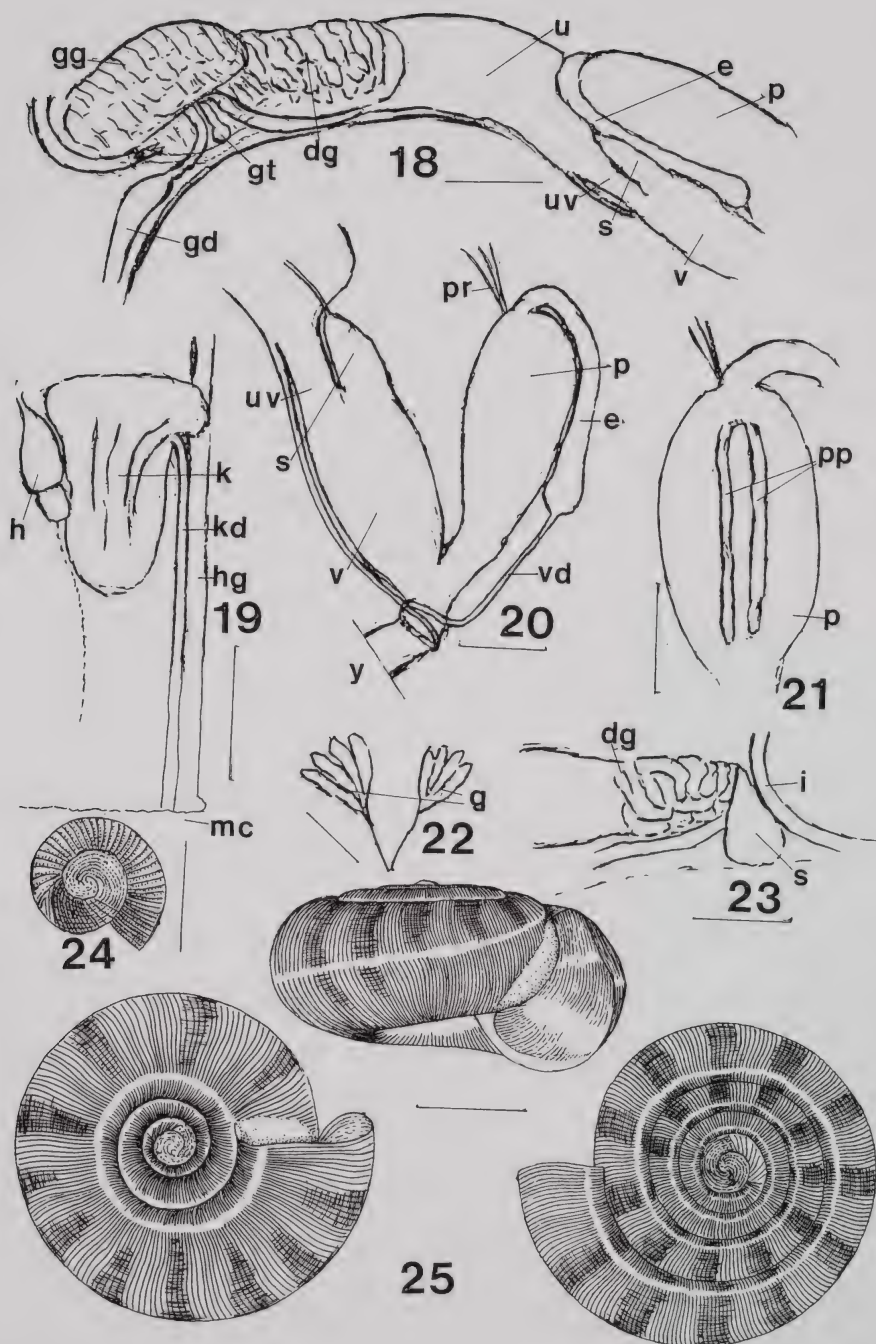
DESCRIPTION

Shell small (up to 3.0 mm x 1.5 mm), subdiscoidal, with four and a quarter whorls (final whorl 0.78 mm, one third to one quarter diameter). Spire slightly raised, umbilicus 0.3 of shell diameter. Protoconch small, one and three quarter whorls; first whorl with seven spiral lirae; second quarter with fine oblique axial lirae (up to 17) crossing the spirals; third half with stronger straighter lirae free of spirals (about 34 per mm). Teleoconch whorls have close axial ribs (95 on first, 36 per mm on last whorl), with one or two barely discernable secondary ribs between. These axials arise at right angles from a moderately deep suture and are slightly sinuous past the shoulder of the whorl. The whole surface plus the first half of the protoconch is overlaid with fine, close microscopic lirae. Colour consists of indistinct radial bands of amber brown (pl.3 13k R.C.S.) against a cartridge buff (pl.30 19f R.C.S.) background, these bands discernable right into umbilicus.

Ovotestis comprising two clusters of alveoli (0.5 mm long) with digestive gland tissue between positioned just beyond stomach and intestine entry. Hermaphrodite duct a fine tube arising from ovotestis with enlarged tapered medial section, reducing to short narrow tube entering albumen gland. Albumen gland a dense crenellated oval organ into which hermaphrodite duct enters distally alongside a protruding carrefour with diverticulate talon and proximal spermoviduct tube. Spermoviduct contains a dense prostatic portion (about one third length of spermoviduct) abutting albumen gland. Pear shaped spermathecal sac (0.5 mm long) resting on intestine loop. Free oviduct short (one third length of vagina). Proximal spermathecal duct same width and length as free oviduct. Vagina rather broad (equal to combined width of free oviduct and proximal spermathecal duct). Vas deferens completely encircles short atrium chamber. Epiphallus, nearly same length as penis, slightly bulbous at union with vas deferens. Penis retractor muscle attached to apex of penis adjacent epiphallus entry. Penis club shaped (1.95 mm long) with two long pilasters. Kidney (1.6 mm long) weakly bilobed the limb overlying the rectum very small. (Anatomy based on one specimen from the East Cape Lighthouse reserve, 3.0 mm x 1.5 mm, G.B. 20/9/92 AK152168.)

REMARKS

At the East Cape Lighthouse Reserve *C. isolata* and *C. barkeri* were the only *Climocella* species collected. Shells of adult mature animals were easy to separate but specific differentiation of a large number of juveniles was difficult. The narrower final whorl of the mature shell (by comparison with *C. barkeri*) provided the best character for specific identification



Figs 18-25. Shell and anatomy of *Climocella isolata* n. sp. Scale lines 19, 25 = 1 mm, 18, 20-24 = 0.5 mm. Abbreviations as for Figs 1-8. 18. R.H. view of genitalia. 19. Pallial cavity and kidney. 20. Terminal genitalia. 21. Penis pilasters. 22. Ovotestis. 23. Position of spermathecal sac. 24, 25. Shell and protoconch of holotype (AK72896).

at the type locality. Specimens collected in the Kopuapounamu Valley also had a final whorl noticeably narrower than any other *Climocella* in the area.

TYPE LOCALITY: East Cape lighthouse reserve, Z14 992754.

HOLOTYPE: Auckland Museum AK72896, 3.0 mm x 1.5 mm, G.B. 20/9/92.

PARATYPES: Type locality AK72897, G.B. 20/9/92 (1 ad. damaged, 4 juv.); AK72936, P.M. 1/6/96 (1); M.77974 mamaku and broadleaf Z14 991752, F.C. 19/5/83 (3 ad., 4 juv.).

OTHER MATERIAL EXAMINED

East Cape, Otiki Res. Z14 992754, G.B. 20/9/92, AK151779, AK151780. East Cape Z14 990754, N. Douglas 8/4/77, AK85637. Kopuapounamu Valley. Z14 815781, F.C. 19/5/83, M.78033.

DISTRIBUTION AND HABITAT

Several locations around the East Cape lighthouse and further west in the Kopuapounamu Valley are the only known locations for *C. isolata*, but as the high country between the locations has not been sampled it will probably be found living there also. Even so the present known range is extremely limited. *C. isolata* was found in grass and sedge at East Cape and at Kopuapounamu under sparse kahikatea amongst grass (P.M., pers. comm.).

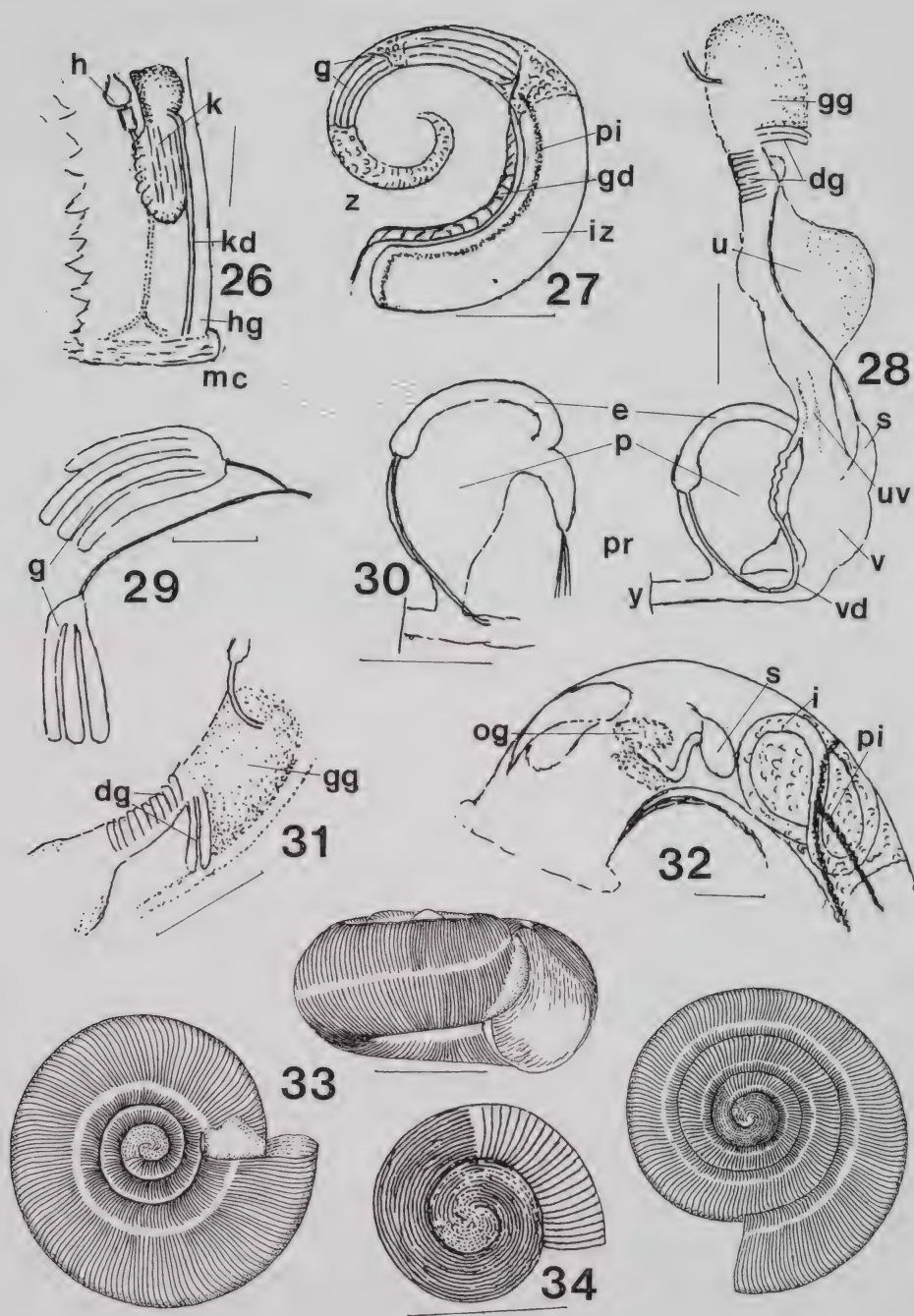
Climocella mayhillae n. sp. Figs 26-34, 57

ETYMOLOGY: Named for Pauline Mayhill.

DESCRIPTION

Shell small (up to 2.7 mm x 1.4 mm), subdiscoidal, four regularly increasing whorls, the last, 0.2 of total diameter. Spire flat, umbilicus 0.3 of total shell diameter. Protoconch with one and three quarter whorls; first one and a quarter whorls with nine spiral lirae; next half whorl with straight distant axials (27 per mm). Teleoconch whorls have close axial ribs (106 on first 23 per mm on last whorl) with no discernable secondary ribs between. These axials rise from a deep suture, angled in direction of growth over shoulder and top of shell, sweeping back near the perimeter towards umbilicus. Surface, including last half of protoconch, covered with strong, close, microscopic spirals. Shell unicoloured, Dresden brown (pl.15 17k R.C.S.) when fresh. (The shell size given is of the dissected specimen. Other details relate to the holotype which is smaller.)

Ovotestis consisting of two long clusters of alveoli (1.17 mm and 0.9 mm), with some digestive gland tissue between, occupying nearly the whole width of the viscera just behind stomach apex. Hermaphrodite duct comprising a short fine tube arising from ovotestis and long enlarged section (1.5 mm) to albumen gland. Prostate gland in two portions, two long separate structures immediately under the albumen gland and a short section of alveoli fused to the proximal part of the sperмовидuct. Distal portion of sperмовидuct (0.8 mm) translucent and bulbous on one side. Free oviduct short (0.4 mm). Vagina longer (0.6 mm), bulbous. Spermathecal duct with a thickened base half width of free oviduct, continued as a slender tube adjacent to sperмовидuct to a sac lying beside albumen gland. Penis globular (1 mm long),



Figs 26-34. Shell and anatomy of *Climocella mayhillae* n. sp. Scale lines 33 = 1 mm, 26-32, 34 = 0.5 mm. Abbreviations as for Figs 1-8. 26. Pallial cavity and kidney. 27. ovotestis, stomach and hermaphrodite duct. 28. R.H. view of genitalia. 29. Ovotestis. 30. Penis. 31. Prostatic gland. 32. Position of spermathecal sac. 33,34. Shell and protoconch of holotype (AK72898).

with a tubular caecum at its apex to which attaches the penial retractor muscle. Epiphallus, half length of penis entering at base of caecum. Kidney weakly bilobed, verge of long lobe slightly crenellated. Upper membrane of pallial cavity with considerable black pigmentation. (Based on one dissection from Ngaiotonga, 2.7 mm x 1.4 mm, P.M. 1/3/96 AK152169, and one from Drinnan Rd., Parakao, 2.5 mm x 1.2 mm, P.M. 1/5/96 AK152170.)

REMARKS

This animal is quite distinctive and is unlikely to be confused with other *Climocella*. The brown shell is similar to some *C. reinga* which have, however, much closer ribbing. *C. mayhillae* is not common, and material from the sites of the dissected snails was scarce. The Parakao specimen dissected was not yet fully adult, the separate, proximal, prostatic alveoli still coiled and the spermoviduct partly collapsed. The black pigmentation over the pallial cavity was stronger on the younger snail.

TYPE LOCALITY: Ngaiotongo State Forest, 140 m Q05 237545.

HOLOTYPE: Auckland Museum AK72898, 2.5 mm x 1.25 mm, P.M. 1/3/96.

PARATYPES: AK72899, Ngaiotonga S.F. 110 m Q05 231546, P.M. 1/4/81 (1); M.129903, Ngaiotonga viewpoint 120 m Q05 238545, P.M. 1/4/81 (1).

OTHER MATERIAL EXAMINED

Bland Bay Islet Q05 350497, F.B. 26/3/96, AK151861. Glenbervie S.F. Q06 344197, P.M. 1/11/86, M.98265. Harrison Res. Q05 114545, P.M. 1/11/88, AK151670. Moturoa Is. Q05 094648, P.M. 1/1/90, AK151723. Ngaiotonga Q05 231546, P.M. 1/4/81, AK151666; Q05 237545, P.M. 1/3/96, AK151667. Parakao, Drinnan Rd. P06 988141, P.M. 1/9/84, AK151722. Puketū P05 704626, P.M. 1/12/81, M.78648. Puketotara Rd. P05 896616, P.M. 1/11/87, AK151669. Te Ringa Tr. Q05 256520, P.M. 1/11/88, AK151671. Utakura P05 714474, P.M. 1/11/87, AK151668. Waipapa Tr. P05 827659, P.M. 8/11/89, M.114428.

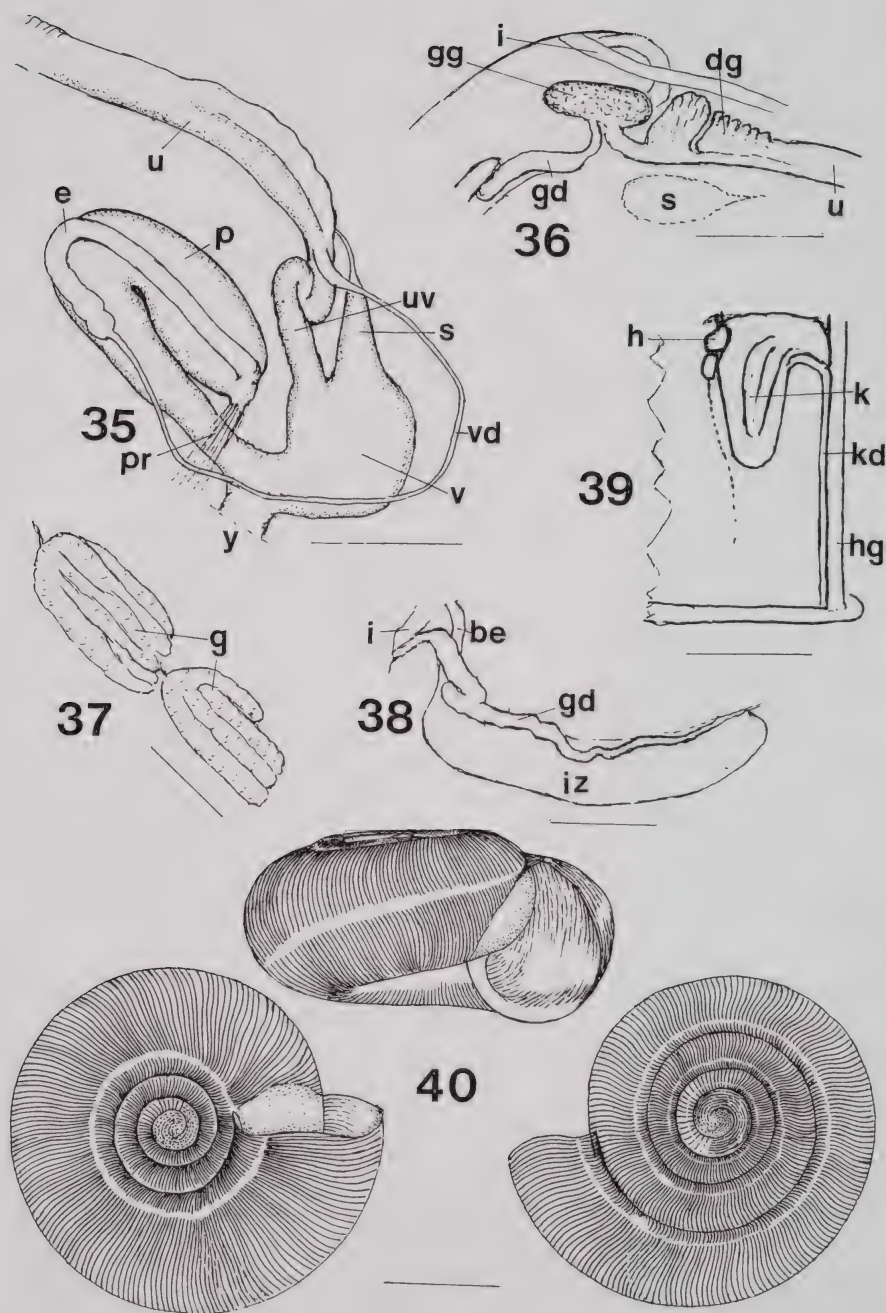
DISTRIBUTION AND HABITAT

This species occurs in a band across mid Northland but is patchily distributed. It was found most abundantly in coastal broadleaf-podocarp forest in Harrison Reserve in the Bay of Islands. All the other sites produced only one or two specimens each. The live snail dissected from the type locality was found under rimu bark on the ground.

Climocella reinga n. sp. Figs 35-40, 57

Mocella cogitata Iredale: Gardner (1967) (in part). *Trans. Roy. Soc. N.Z., Zoology*, 8(21):219. *Charopa (Mocella) eta* (Pfr): Climo (1970) (in part). *Rec. Dom. Mus.* 6(18):314. "*Mocella*" cf. *manawatawhia*: J.F. Goulstone, P.C. Mayhill and G.R. Parrish (1993). *Tane* 34:11.

ETYMOLOGY: Named after Cape Reinga.



Figs 35-40. Shell and anatomy of *Climocella reinga* n. sp. Scale lines 40 = 1 mm, 35-39 = 0.5 mm. Abbreviations as for Figs 1-8. 35. Genitalia to albumen gland. 36. Albumen gland and hermaphrodite duct. 37. Ovotestis. 38. Hermaphrodite duct. 39. Pallial cavity and kidney. 40. Shell of holotype (M.129904).

DESCRIPTION

Shell small (up to 2.9 mm x 1.5 mm), subdiscoidal, four and a quarter regularly increasing whorls, the last, one quarter of total diameter. Spire flat to slightly convex, umbilicus 0.3 of shell diameter. Protoconch one and three quarter whorls; first with six spiral lirae, last three quarters with straight axials only (c. 27), distant at first, close near teleoconch. Teleoconch whorls have close axial ribs (88 on the first, 23 per mm on final whorl), and three or four extremely fine secondary axials in interstices, dominated however by strong crowded microscopic spirals covering the main axials and extending onto last three quarters of protoconch. Axials from moderate suture, undulating over whole surface. Colour uniformly Mars brown (Pl. 15, 13M, R.C.S.). (Based on the holotype.)

Ovotestis comprising two long, thin clusters (0.8 mm & 0.6 mm long) of alveoli extending horizontally from just past apex of stomach and surrounded by digestive gland tissue. Hermaphrodite duct a fine tube arising from ovotestis gradually thickening for 0.8 mm then narrowing to enter albumen gland. Albumen gland small. Spermathecal duct (0.7 mm long), no more than a thick tube with a small proximal bulge containing a segment of prostatic gland. Free oviduct a continuation of this tube (0.2 mm), leads to bulbous vagina and base of spermathecal duct. Spermathecal duct with opening twice width of free oviduct, tapering rapidly to a fine tube; spermathecal sac resting over a loop of intestine close to albumen gland. Penis elongate (1.25 mm. long), folded, proximal half a solid oval organ with retractor muscle attached apically alongside epiphallus entry, distal half a thick tube. Epiphallus an elongate tube slightly bulbous at entry of vas deferens. Kidney bi-lobed with longer pericardial lobe (0.8 mm) placed some distance from ureter and hindgut. (Based on two dissected animals from type locality, Tapotupotu: 2.2 mm x 1.2 mm, F.C. 30/4/68, AK152228; 2.7 mm x 1.4 mm, B.F. Hazelwood and O.J. Marston 5/6/96, AK152171).

REMARKS

The specimens dissected from 1968 collections had white shells but live and freshly dead specimens from the same site collected in 1996 were brown. All old specimens (more than five years) in museum collections were bleached. It seems that empty shells from forest locations bleach white very quickly whereas specimens from shrubland, such as those at Herangi, remain brown longer. Although many of the shells seen had a flat spire, some, including the hundreds of sub-fossil specimens from the Aupouri sand dune archaeological sites, had a slightly raised spire. Variations in rib density, even amongst specimens from the same site, were noticed but no measurements taken. I dissected an animal from Dr Climo's 1968 preserved material and found the anatomy essentially as he depicted (Climo 1969). I have, however, illustrated a specimen collected by Hazelwood and Marston in 1996 which was larger and more mature. This specimen had a brown shell, thicker vagina and more developed prostatic gland than the Climo material.

TYPE LOCALITY: Junction of Cape Reinga Rd. and Tapotupotu Rd., M02 838512.

HOLOTYPE: Museum of New Zealand M.129904, 2.9 mm x 1.5 mm, B. Hazelwood and O.J. Marston 5/6/96.

PARATYPES: All from type locality. M.129905, F.C. 30/4/68 (1), M129906, B.F. Hazelwood

and O.J. Marston 5/6/96 (2 adults, 1 juv.), AK72900, B.F. Hazelwood and O.J. Marston 5/6/96 (10), AK72901, B.F. Hazelwood and O.J. Marston 5/6/96 (2 whole organisms).

OTHER MATERIAL EXAMINED

Subfossil

Aupouri sand dune archaeol. study N02 942356, N2/876, M.74070; N03 074226, N3/582, M.77274; N03 126140, N3/455, M.74040; N03 056201, N3/499, M.74059; N02 960323, N2/823, M.87699; N03 051196, N3/156, M.74019; N03 056201, N3/499, M.74013; N03 120153, N3/823, M.74675 - all R. Wallace 1980. N03 125136, N3/450, J. Coster 1981, M.70435. Taupiri Is. Holocene subfossil M02 792469, M02/f76, F.B. & J. McCallum, AK91777. Te Werahi Holocene subfossils M02 811484, M02/f86, AK101147; M02 813483, M02/f89, AK91673; M02 788473, M02/f75, AK91722; M02 802478, M02/f105, AK99946; M02 796481, M02/f101, AK92167; M02 816497, M02/f111, AK99994; M02 786475, M02/f99, AK91851; M02 797472, M02/f77, AK91759; M02 799479, M02/f100, AK100006 - all F.B. 1/10/93. M02 800478, M02/f81, AK91833; M02 799473, M02/f78, AK91825, F.B. & C. Laurenson 24/1/95.

Contemporary

Cape Maria van Diemen, paraspiritus colony M02 797472, M.99449; M02 786473, M.99429, R.P. 27/9/88; P.R. Jamieson 1/9/76, M.88669; B.H. & O.J. Marston 7/6/96, M.124283. Consobrinus colony, Cape Maria van Diemen, B.H. 2/1/76, M.70082. Cape Reinga M02 818532, F.B. 4/6/94, AK89348. Darkies Ridge M02 879503, R.P. 20/10/89, M.16168. Great Exhibition Bay N03 179204, N. Douglas 24/5/71, AK152044. Haupatoto N02 068486, A.-C.-O. 4/3/85, M.77002; N02 065488, P.M. 1/3/88, AK152018. Herangi M02 811478 AK92151, M02 812478 AK151937, F.B. 1/10/93; Kerr Point, near *P. watti* colony N02 101549, D.R. 8/10/76, M.56354. Kohuronaki N02 966448, M.79617; N02 969449, M.79651, A.-C.-O. 1/7/84; N02 966449, G. Carlin 1/7/84, M.79641. Maungapika N02 983534, R.P. 28/7/88, M.99457, J.G. 11/5/91, AK97612. Mokaikai N02 099480, P.M. 1/3/88, AK152020. Motuopao Is. M02 778480, R.P. 29/7/88, M.89821. Muriwhenua N02 068519, P.M. 1/10/88, AK152005; N02 067520, P.M. 1/3/88, AK152012; N02 073518, P.M. 1/10/88, AK152021. Mt. Camel N03 258088, R.P. & K. Walker 26/3/88, M.96556; B.H. 4/1/76, M.47294; P.R. Jamieson 12/1/75, M.88460. Ngatuiiau Str. N02 043530, A.-C.-O. 1/11/86, M.87873. Pandora M02 897483, D.R. 29/12/78, M.103945; N. Gardner 2/1/50, AK85688; M02 896498, P.M. 1/10/88, AK152025. Pandora Rd., F.C. 5/9/71, M.38246, M02 888488; 8/3/67, AK85687. Ponaki Str. N02 086463, A.-C.-O. 1/11/86, M.87836. Radar Bush M02 897476, P.M. 1/4/83, M.79325 AK152009; N02 897476, P.M. 1/5/82, AK152016. Spirits Bay N02 993521, P.M. 1/5/82, AK152015. Spirits Bay - Te Hapua junction N02 966449, A.-C.-O. 4/3/85, M.81779; N02 995448, P.M. 1/10/86, M.97258; N02 997452, P.M. 1/10/86, AK152017; N. Douglas 25/5/71, AK151930, 13/5/73, AK85686. Tapotupotu M02 845518, B.H. & O.J. Marston 5/6/96; M02 837511, O.J. Marston, M.76589; M02 853516, N. & L. Douglas 1/6/69, AK151863. Tapotupotu Tr., B.A. Holloway 3/12/60, M.38291; M02 879484, P.M. 1/3/88, M.116614 AK152003. Tawekaweka Str. N02 104537, A.-C.-O. 5/3/85, M.77047. Te Hapua Rd. N02 003450, N. Douglas 25/5/71, AK151862; N02 997452, P.M. 1/3/96, AK151678. Tom Bowling Bay N02 073519, P.M. 1/5/85, M.82062; N02 075520, P.M. 1/10/86, AK152013; N02 067503, B.H. 7/10/76, M.55452, M.72444. Taumatara Flat N02 064494, R.P. 17/3/88, M.99109; N02 056497, P.M. 1/3/88, AK152008. Unuwahao N02 009522, M.87735, N02 009518, M.87917, N02 006520, M.87947, A.-C.-O. 1/11/86; N02 125240, P.M. 1/4/83, M.79028; N02 014522, P.M. 1/10/88, AK152011; 1/5/82, M.79370; N02 017518, P.M. 1/5/82, AK152007; 260m, A.W.B. Powell 1/2/32, AK25715; N02 009522, AK151936, N02 013523, M.124286, B.H. & O.J. Marston 6/6/96. Waihi Str. N02 005527, J.G. 10/5/91, AK97125. Waterfall Gully N02 991525, AK85685. Whareana N02 106487, A.-C.-O. 5/3/85, M77024.

DISTRIBUTION AND HABITAT

C. reinga is present throughout the Te Pahi region and at least as far south as Mt. Camel living both in broadleaf forest and shrubland. It is also a characteristic species in Holocene dune snail faunas in the Te Werahi area (F. Brook, pers. comm.), and is extremely abundant in some archaeological dune sites on Aupouri Peninsula (R. Wallace, pers. comm.).

***Climocella runga* n. sp. Figs 41-48, 57**

ETYMOLOGY: Derived from Maori, *runga* = above, top.

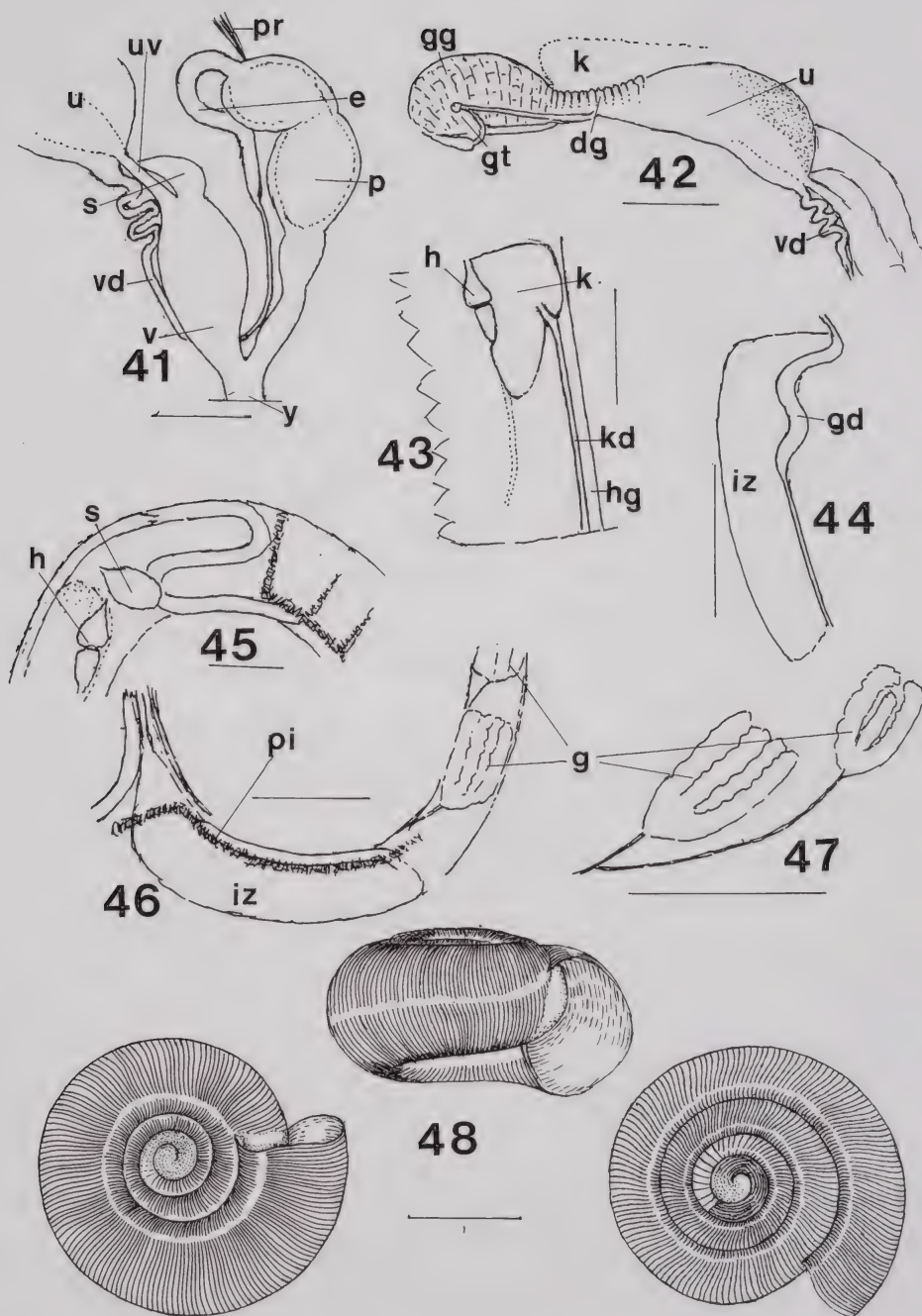
DESCRIPTION

Shell small (up to 2.4 mm x 1.3 mm), subdiscoidal, four whorls, first two narrow and depressed, third expanded and raised, fourth expanded and dropping. Final whorl 0.27, umbilicus 0.34 respectively of total shell diameter. Protoconch one and a half whorls, first one and a quarter whorls with six spiral lirae, last quarter with ten solid distant axials (27 per mm) slightly oblique in direction of growth. Teleoconch whorls have tall rectangular axial ribs (72 on first, 27 per mm on last whorl), with three or four fine secondary axials between; these ribs arise from a deep suture at a strong oblique angle in the direction of growth but once over the shoulder the angle lessens. Microscopic spirals though present are hardly visible at 20x magnification except as faint crenellations on top of ribs. Unicoloured, cream buff (pl.30 19d R.C.S.). (Based on the holotype.)

Ovotestis comprising two clusters of alveoli (the longer one 0.4 mm, and 0.4 mm from stomach apex). Both separated by digestive gland tissue but taking up nearly all the visceral space. Hermaphrodite duct a thin tube arising from ovotestis with medial enlarged section (0.5 mm long), reducing to short thin section terminating in carrefour and diverticulate talon embedded near apex of albumen gland. Distal portion of hermaphrodite duct surrounded by stomach tissue. Albumen gland oval (0.8 mm). Spermoviduct, proximal portion with prostatic gland, distal portion swollen on one side and partly translucent (combined sections 1.36 mm long). Free oviduct very narrow and short (0.35 mm). Vagina long (1.1 mm) and oval. Spermathecal duct over twice width of free oviduct tapering to a fine tube that runs adjacent to spermoviduct terminating in a small oval sac (0.43 mm long) lying partly over a coil of intestine. Penis (1.6 mm long) of two equal parts: a solid proximal section, sausage shaped, squeezed near centre making the top piece lean over and a distal section consisting of a tube with two minor bulges leading to the atrium. Epiphallus a narrow tube over half penis length, enters apically close to retractor muscle. Kidney bilobed, pericardial segment stronger. Stringy white pigmentation along stomach and over albumen gland and proximal section of spermoviduct. (Based on three dissections: N02 110479 near Maukins Nook, 2.4 mm x 1.2 mm, R.P. 16/3/88, AK152172; N02 048499 Poroiki Hill, 2.4 mm x 1.3 mm, R.P. 18/3/88, AK152173; N02 960455 Kohuronaki, 2.7 mm x 1.4 mm, B.H. & O.J. Marston 4/6/96, M.124280).

REMARKS

The section of the vas deferens that arises from the spermoviduct contained many folds on the Maukins Nook specimen but was straight for Poroiki Hill specimens. The dissected Kohuronaki specimen had a slightly shorter vagina and longer oviduct which made the base



Figs 41-48. Shell and anatomy of *Climocella runga* n. sp. Scale lines 43, 48 = 1 mm, 41, 42, 44-47 = 0.5 mm. Abbreviations as for Figs 1-8. 41. Terminal genitalia. 42. R.H. view of genitalia. 43. Pallial cavity and kidney. 44. Hermaphrodite duct. 45. Spermathecal sac and heart. 46. Stomach and ovotestis. 47. Ovotestis. 48. Shell of holotype (AK72902).

of the spermathecal duct very much larger and more dominant than the free oviduct from which it diverged quite strongly. Shell differences were noted at all sites with variations particularly noted in rib density, angle of ribs from suture and strength of microscopic spirals. The anatomical differences were not associated with distinct shell form and they did not appear to be regionally based. I considered them as intraspecific. *C. runga* is generally smaller than *C. reinga* and always has a depressed spire. Colour of fresh specimens, an angled rib, low strength of microscopic spirals, and expanded final whorl are other differentiating features. On the evidence to date this is not a common snail and was evidently overlooked in the past. No preserved material was available from the type locality.

TYPE LOCALITY: Unuwahao summit, in litter on south side, steep with thick kiekie. N02 008521.

HOLOTYPE: AK72902, 2.4 mm x 1.3 mm, J.G. 10/5/91.

PARATYPES: AK72924, Unuwahao N02 017518, P.M. 1/5/82 (3); AK72903, type locality, J.G. 10/5/91 (2); M.129907, type locality J.G. 10/5/91 (2).

OTHER MATERIAL EXAMINED

Kohuronaki N02 966448, M.79617, N02 968450, M.79664, G. Carlin 1/7/84; N02 958458, P.M. 1/5/85; N02 960455, M.124281, N02 958459, M.124287 M.124288 (whole organism) B.H. & O.J. Marston 4/6/96. Pandora M02 894492, P.M.1/5/85, M.82080 AK152023. Poroiki Hill N02 048499, P.M. 1/3/88, AK152022. Radar Bush M02 897476, P.M. 1/4/83, M.129906 AK152010; M02 896476, P.M. 1/3/88, AK152019. Tapotupotu track M02 879484, P.M. 1/3/88, AK152004; Tom Bowling Bay N02 075519, P.M. 1/10/86, M.97204; N02 073519, P.M. 1/5/85, M.82062; N02 075520, P.M. 1/10/86, AK152014. Unuwahao N02 012524, P.M. 1/4/83, M.79370 AK152014; N02 008521, J.G. 10/5/91, AK9716; N02 007526, B.H. & O.J. Marston, M.124282. Waihi Str. N02 005527, J.G. 10/5/91, AK151865. Waterfall Gully N02 990524, N. Douglas 2/10/75, AK151864.

DISTRIBUTION

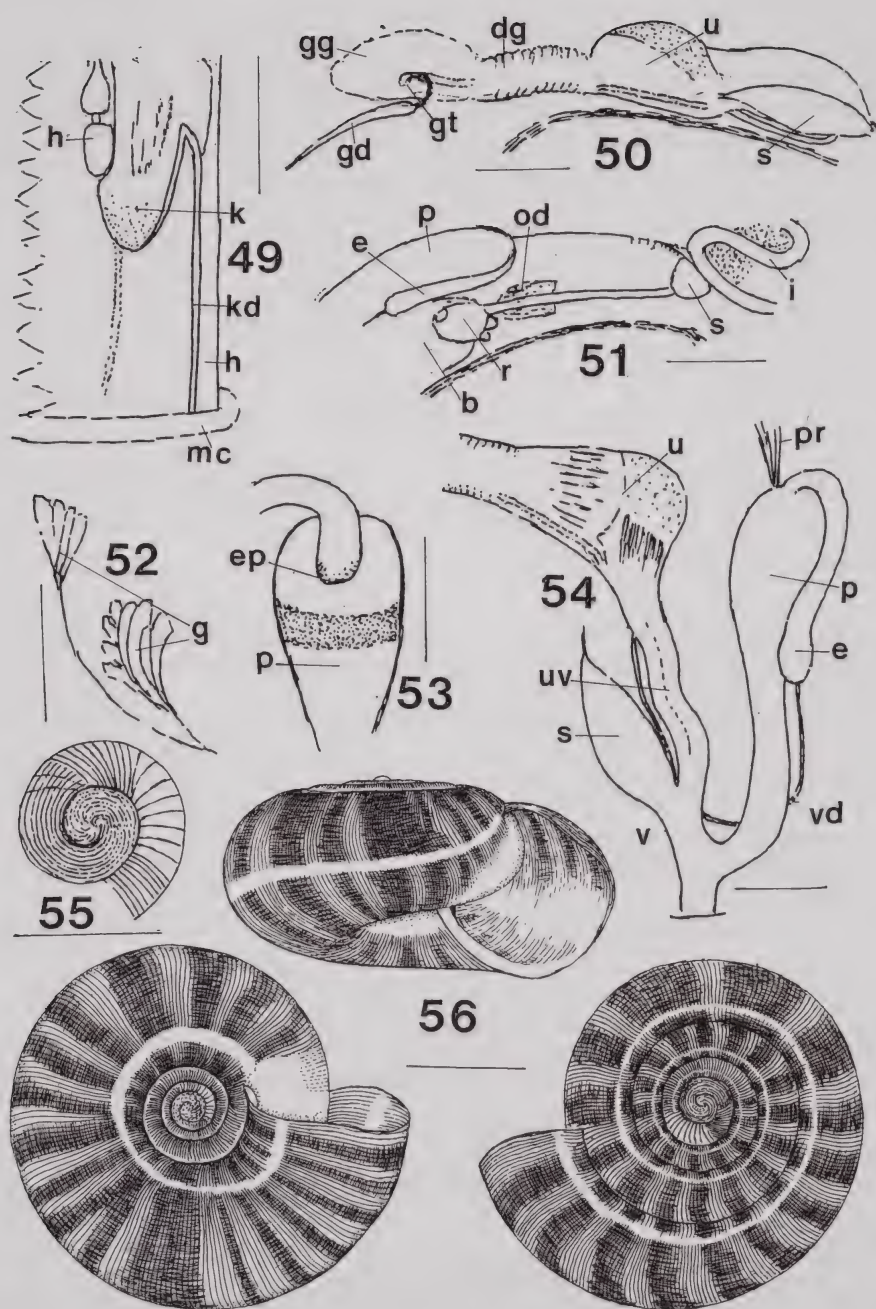
C. runga was collected from Pandora east to Maukins Nook and south to Kohuronaki. It is apparently endemic to the Te Paki region. The species seems to prefer the higher altitude sites with thick forest cover, the greatest numbers being found on Unuwahao and Kohuronaki.

Climocella waenga n. sp. Figs 49-56, 57

ETYMOLOGY: Taken from the Maori place name, *waenga* = middle.

DESCRIPTION

Shell small (up to 3.1 mm x 1.6 mm), subdiscoidal, four and a half regularly increasing whorls. Last whorl and umbilicus 0.27 and 0.25 respectively of total shell width. Spire slightly raised. Protoconch one and three quarter whorls; first whorl with eight spiral lirae; next half with crowded oblique axials (c. 25), first widely spaced, all crossed by spirals; last quarter with 22 widely spaced straight axials (27 per mm). Teleoconch whorls have close, broad based, rounded axial ribs (105 on first, 31 per mm on final whorl) with one or two fine secondary



Figs 49-56. Shell and anatomy of *Climocella waenga* n. sp. Scale lines 49,56 = 1 mm, 50-55 = 0.5 mm. Abbreviations as for Figs 1-8. 49. Pallial cavity and kidney. 50. R.H. view of genitalia, 51. L.H. view of genitalia. 52. Ovotestis. 53. Apical section of penis. 54. Terminal genitalia. 55,56. Shell and protoconch of holotype (AK72904).

axials in the narrow space between. These axials emerge at right angles from a moderately deep suture and are sinuous over the shell surface. The whole teleoconch plus the last quarter of the protoconch is overlaid with fine dense microscopic spiral lirae. Colour consists of variable bands of russet (pl.15 13k R.C.S.) on a cartridge buff (pl 30 19f R.C.S.) background covering the whole shell. The lighter bands are narrow, the shell is predominantly russet. (Based on the holotype.)

Ovotestis comprising two fan shaped clusters of alveoli (0.45 mm long) with digestive gland tissue between placed just beyond apex of stomach. Hermaphrodite duct emerging as a fine tube from ovotestis slowly enlarging for 0.8 mm at distal end, then reducing sharply to a narrow tube terminating in the carrefour with diverticulate spherical talon partly embedded in the albumen gland. Albumen gland under loops of intestine with hermaphrodite gland entering centrally. Proximal section of spermoviduct (0.6 mm long) containing the prostatic alveoli. Distal section (1 mm long) enlarged along one side with a semi-transparent bulge. Free oviduct long (0.6 mm) moderately wide. Thickened base of spermathecal duct oval before tapering to a fine tube; spermathecal sac (0.47 mm long) pear shaped, rests against loop of intestine. Vagina a short thick tube about same width as distal end of penis. Penis (1.95 mm) a long tube the proximal half expanded with a noticeable thick ring above the middle. Retractor muscle attached to penis apex alongside entry of epiphallus. Epiphallus half length of penis, protruding into it a little. Kidney bilobed, limb overlying rectum small. Some black pigmentation on the pallial cavity wall over the pericardial lobe and along the ureter. (Based on two dissections from Waenga, 3 mm x 1.5 mm and 2.7 mm x 1.4 mm, G.B. 16/9/92, AK152174 and one from Te Koau, 2.2 mm x 1.3 mm, G.B. 23/9/92, AK152175.)

REMARKS

The description above relates primarily to the larger snail from Waenga, the smaller had a relatively longer epiphallus (0.6 of penis length) and the thickening of the proximal penis wall was replaced by a slight restriction. The specimen from Te Koau was juvenile with only the penis developed, though small. *C. waenga* has not been found in sympatry with *C. intermedia* with which it might be confused on shell character. *C. waenga* is larger, darker coloured and has a smaller umbilicus. It is the most highly coloured of all the species of *Climocella* described so far.

TYPE LOCALITY: Waenga, Y14 653915, alt. 100 m.

HOLOTYPE: AK72904, 3.1 mm x 1.6 mm, P.M. 1/3/93.

PARATYPES: All from type locality. AK72905, P.M. 1/3/93 (7); M.129908 P.M. 1/3/93 (7).

OTHER MATERIAL EXAMINED

Hicks Bay Z14 771901, G.B. 20/9/92, AK151770; Z14 769901, P.M. 1/3/93, AK151763; Z14 774900, P.M. 1/3/93, AK151744. Hikurangi Y15 656581, P.M. 1/12/80, AK151784. Hikurangi Gate Str. Y15 562593, F.C. 5/12/83, M.78104. Lottin Bay Y14 621896, D.R. 10/7/78, M.104461; Y14 653913, R. Prasad & J. Kenny 11/4/95, AK96750. Otanga Y14 664922, P.M. 1/3/93, AK151759. Rangiatea Z14 762986, G.B. 20/9/92, AK151767. Raukumara S.F. Y14 707697, P.M. 1/6/87 AK151866. Te Araroa Z14 852828, P.M. 1/12/80, AK151922. Te Araroa - Hicks Bay Z14 783865, N. Douglas 1/4/77, AK85674; Z14 778867, N. Douglas 9/4/77, AK151766. Te Koau Z14 778864, P.M. 1/3/93,

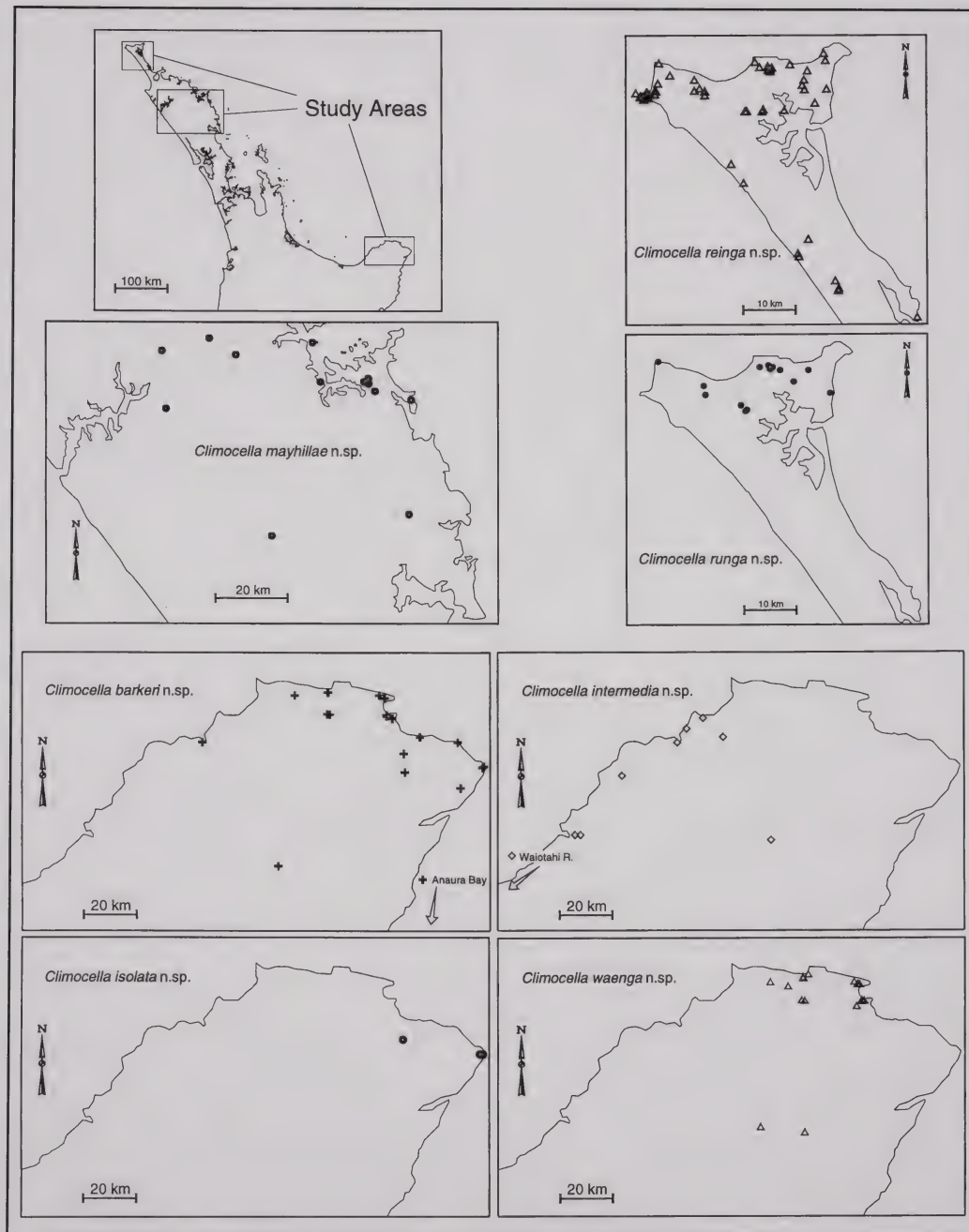


Fig 57. Maps showing distribution of locality records of the seven species of *Climocella* from northern New Zealand described in this paper.

AK151805; Z14 767853, P.M. 1/3/93, AK151756; Z14 782865, G.B. 23/9/92, AK151769. Te Rereauria Y14 583905, P.M. 1/9/92, AK151782. Waenga Y14 653913, P.M. 1/9/92, AK151762; Y14 653915, P.M. 1/9/92, AK151750; Y14 653915, P.M. 1/3/93, AK151743. Waiaroho Y14 650866, G.B. 23/9/92, AK151768; Y14 656865, P.M. 1/3/93, AK151752.

DISTRIBUTION AND HABITAT

Known from the area between Cape Runaway and East Cape, south to the Mt. Hikurangi area. The species is commonly associated with tree ferns and occurs inside rotting tree fern trunks in the fine tilth (P.M., pers. comm.).

DISCUSSION

The descriptions of the seven species in this paper considerably broaden the concept of genus *Climocella*. *C. maculata* in the south and *C. akarana* in the north are wide ranging, but the other species known to date have more restricted distributions. Patterns of anatomy are emerging particularly for the colour-patterned species. All the anatomies of the coloured species studied suggest a monophyletic lineage. It seems necessary in this genus to view the animal before being absolutely certain as to the identity of the shell. Further descriptions of new species, and extensions of range of known species will appear only slowly as preserved animal material becomes available. In this regard since my last paper (Goulstone 1996) I gathered live *C. maculata* from the type locality, Mt. Cook, Governors Bush, AK152176, dissection of which confirmed the anatomy drawn of a specimen from Pongaroa, Hawkes Bay. The Mt. Cook specimens had some black pigmentation over the pallial cavity which was not shown in those from Pongaroa, preserved from 1970, otherwise they were the same. It is regrettable that the genus is unfolding in such a piecemeal fashion and full ranges of species cannot be ascertained but it seems preferable to record information that comes to hand, rather than await the full picture.

Acknowledgements. I have gathered very little of the raw material for this paper myself and would particularly thank the following who supplied live or preserved animals: Fred Brook, Gary Barker, Dr Frank Climo, Bruce Hazelwood and John Marston, Pauline Mayhill, Richard Parrish, Peter Poortman. P. Mayhill also supplied much habitat information and together with G. Barker read the manuscript and made many necessary corrections. I am also indebted to Bruce Marshall and Karin Mahlfeld from the Museum of New Zealand for access to that collection and Dr Bruce Hayward and the staff of the Auckland Museum Marine Department for much support. Dr Hugh Grenfell produced the distribution maps.

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SCUTULOIDEA KUTU, A NEW SPECIES OF SPHAEROMATIDAE (ISOPODA: CRUSTACEA) FROM NEW ZEALAND

A.B. STEPHENSON AND J.L. RILEY

Abstract. A second species of the endemic isopod genus *Scutuloidea* is reported from northern New Zealand waters. *Scutuloidea kutu* sp. nov. is distinguished from *S. maculata* Chilton, 1883 by having a relatively smaller eye, a slender body, a truncated pleotelson lacking an apical notch, and single plate uropods which terminate well before the posterior margin of the pleotelson. *Scutuloidea kutu* can live sympatrically with *S. maculata* but is far less abundant. At this stage its only known habitat is exposed reef environments where it appears in the epifaunas of red seaweeds.

Seasonal samples of seaweed infaunal isopoda from northern New Zealand (Stephenson & Riley 1995) were dominated by species of the family Sphaeromatidae. Most taxa can be determined following Hurley & Jansen (1977). The genus *Scutuloidea* (containing *Scutuloidea maculata* Chilton, 1883), reported to be widely distributed in seaweeds, sponges and bryozoans throughout the New Zealand region, is generally regarded to be monotypic. In the course of our sampling for isopods some exceptionally high densities of *Scutuloidea maculata* were found (Stephenson & Riley 1995) in red seaweed *Plocamium costatum* and elsewhere in *Osmundaria colensoi*. In these collections a second undetermined species of *Scutuloidea* was recognised which we report here.

SYSTEMATICS

FAMILY SPHAEROMATIDAE Hanson, 1905

SCUTULOIDEA Chilton, 1883

TYPE SPECIES: *Scutuloidea maculata* Chilton, 1883.

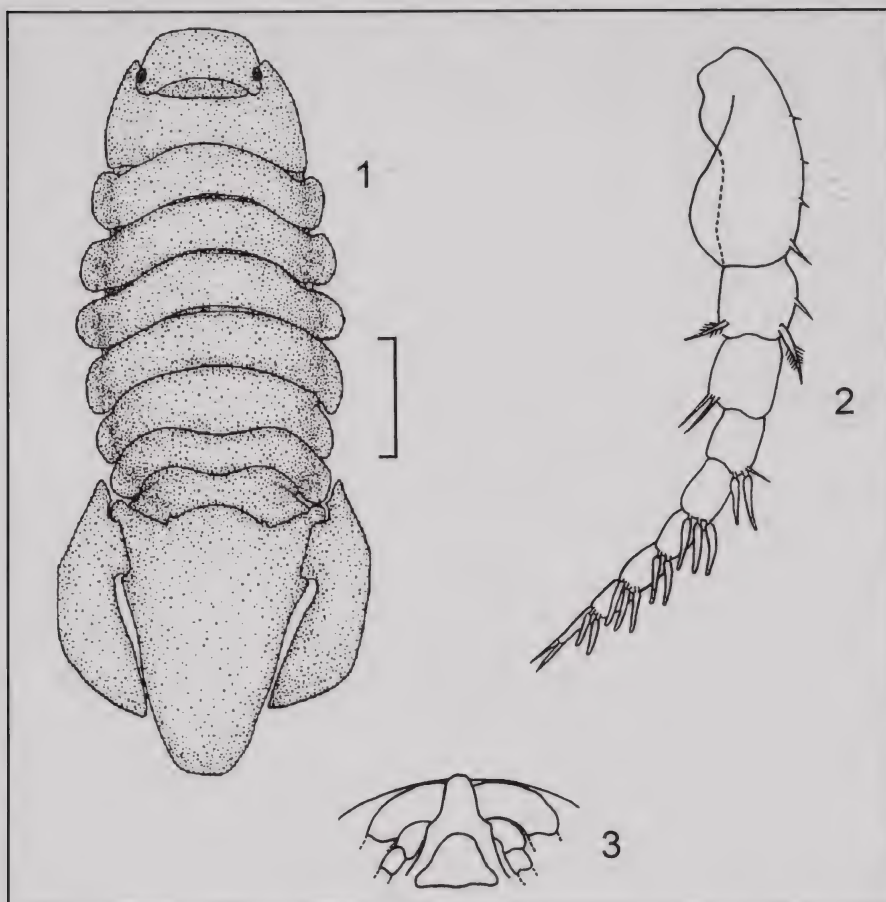
GENERIC DIAGNOSIS

Eubranchiate Sphaeromatidae with outer ramus of pleopoda 3 of two segments. Body narrowly ovoid, surface unadorned. Pleotelson conspicuously large and triangular, uropoda each consisting of a single broad plate. Sexes similar.

Scutuloidea kutu sp. nov. (Figs 1-12)

MATERIAL EXAMINED

HOLOTYPE. Male. (6.0 mm), Fraser Rock, Tapeka, Bay of Islands, New Zealand. 35° 14.5' S, 174° 07.0' E, 9. vii. 1991, from red algae *Plocamium costatum*, subtidal (0.3-1.0 m) exposed rock face. Coll. A.B. Stephenson (AK 72949).



Figs 1-3. *Scutuloidea kutu* sp. nov. 1. Male holotype, dorsal view. 2. Male paratype, antenna 1. 3. Head, ventral view. Scale line 1.0 mm.

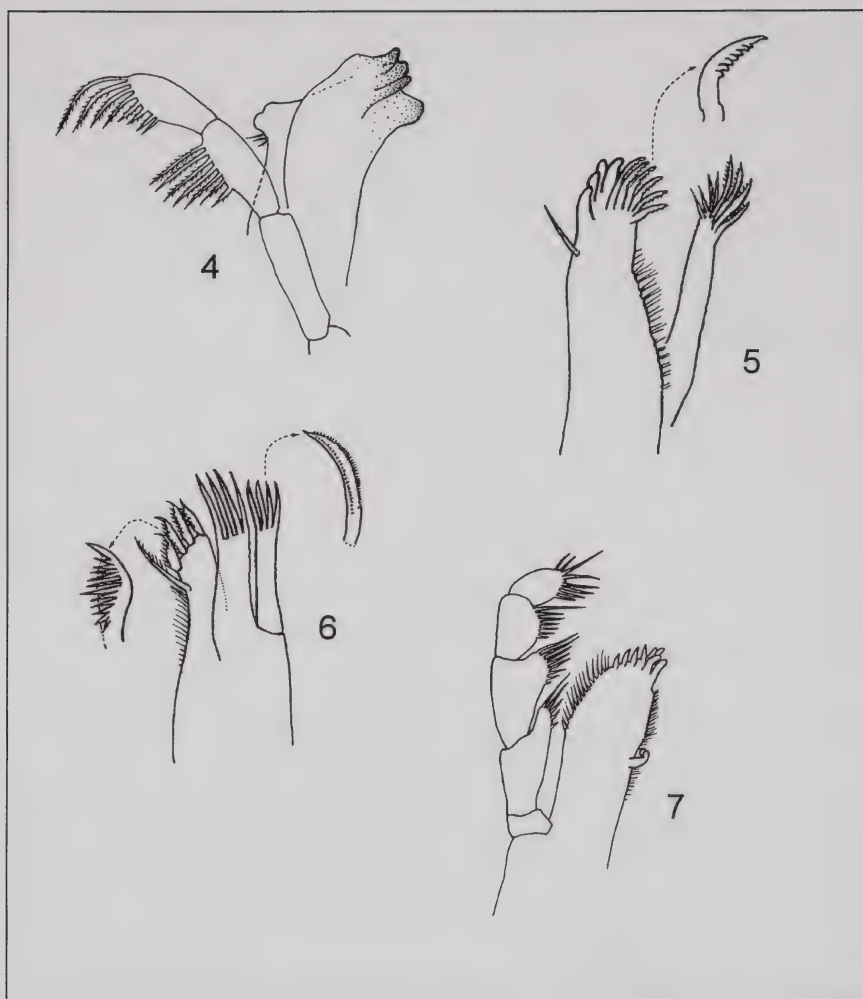
PARATYPES. Males, $n=16$ (5.8-6.6 mm), females, $n=10$ (2.5-4.8 mm), same data as holotype (AK 72950). Males, $n=6$ (7.1-7.6 mm), females, $n=20$ (4.0-5.5 mm) Lion Rock, Piha, Auckland. $36^{\circ} 57.3' S$, $174^{\circ} 28.0' E$, 30. vi. 1992, from red algae *Osmundaria colensoi*, subtidal rock face. Coll. M. S. Morley (AK 72951).

Additional material. Fraser Rock, same locality as holotype, 16. iii. 1992 (AK 75788), 18. xi. 1992 (AK 79082). Spirits Bay, North Cape. $34^{\circ} 25.3' S$, $172^{\circ} 51.3' E$, 7. iv. 1993, from red algae on exposed rock platform. Coll. M.S. Morley (AK 79122).

DESCRIPTION

MALE

Body narrowly ovate, almost truncate. Anterior margin of cephalon with a small rostral projection not visible from above. Cephalon partially immersed in pereonite 1. Eyes very small, carried posteriorly, but lying above anterolateral cusps of pereonite 1. Coxae of

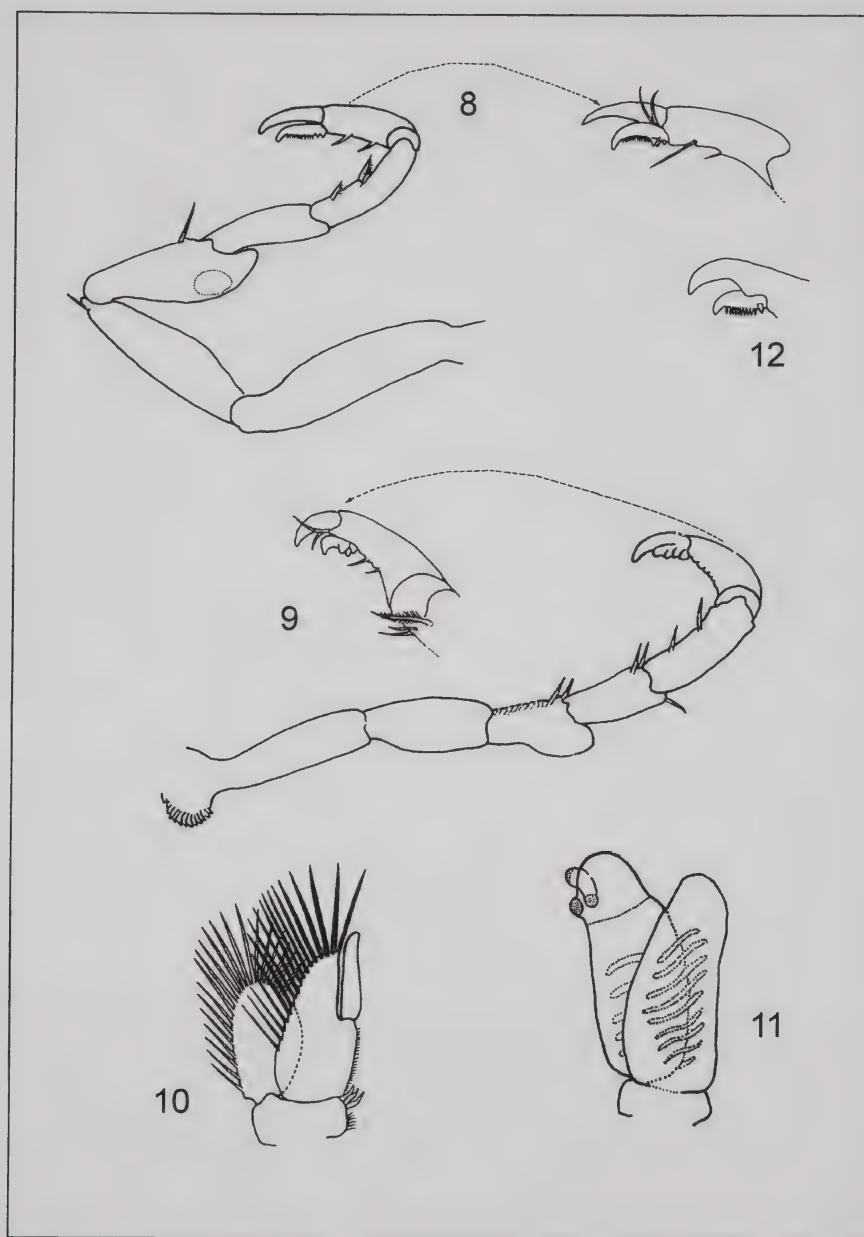


Figs 4-7. *Scutuloidea kutu* sp. nov., male paratype. 4. Left mandible. 5. Maxillule. 6. Maxilla. 7. Maxilliped.

pereonites 2-7 not greatly expanded, fused to tergite, sutures not visible. Pleon of one distinct segment. Apex of pleotelson truncated, never notched.

Antenna 1 peduncle of three segments, segment 1 largest, having a somewhat expanded glove-like appearance with longitudinal groove and lobe along inner face. Flagellum of six segments each sparsely setose, all except the terminal segment bear aesthetascs. Antenna 2 (4 + 9) segments, flagellum has tufts of short setae from each segment. Epistome narrowly rounded, produced anteriorly to separate the bases of antenna 1.

Mandible incisor tricusate, with a broadly curved cutting face medially. Molar process feeble, a tuft of 3-5 short hairs subtended immediately below the molar plate. Mandibular palp of three segments, basal segment longest, segments 2 and 3 with setae. Maxillule has a terminal cluster of stout spines (4) and serrated spines (6) on lateral lobe; simple and plumose setae (4 + 4) on medial lobe. Maxilla with four comb-toothed spines, preceded by a single



Figs 8-12. *Scutuloidea kutu*, sp. nov., male paratype. 8. Pereopod 2. 9. Pereopod 5. 10. Pleopod 2. 11. Pleopod 5. 12. *Scutuloidea maculata*, dactylus pereopod 2.

plumose seta, on medial lobe; middle and lateral lobes each with four minutely serrated spines. Maxilliped endite with 4 + 4 spines, single coupling hook and fine setae confined to the medial fringe. Palp articles 2-5 with setae.

Pereopods progressively increase in size P1-P7; pereopods 2 and 3 slender, less robust, than others. Pereopod surfaces are lightly scaled. Distinct secondary unguis on dactylus of all pereopods; those of P2, P3 having a comb-like distal extension, remainder of a claw and three basal conical projections only. Pereopod 1 propodus with four stout bristle-faced setae on posterior margin; propodus pereopod 2 has two such setae but they do not occur on pereopods thereafter. Merus of all pereopods enlarged anteriorly, in P2, P3 a sub-cuticular gland is apparent.

A dome shaped boss with rasp-like surface sculpture, occurring proximally, from coxopodites of pereopods 4-7, and a contact area at the point of insertion with the pereon is thickened. A short, single, series of hook-like hairs border the anterior margin of coxa 2. These have near contact with a similar patch of hairs, scales, and a sub-marginal ridge arising at the posterolateral border (fused coxa/pereon, segment 1) adjacent to the point of insertion of pereopod 1.

Pleopod 1 exopod oval, endopod sub-triangular, both with natatory marginal setae; endopod medial border with a dense pilose fringe. Peduncle pl 1, medial margin has three coupling hooks. Appendix masculina of pleopod 2, simple, length not exceeding beyond endopod, lightly pilose on distal half of medial border. Exopods of pleopoda 3 and 5 segmented. Pleopod 3, both branches with marginal natatory setae. Exopods and endopods pleopoda 4, 5 pleated; exopods pl 5 with three scaled coupling bosses offset at apex.

Uropoda a single plate (exopod lacking), with a somewhat angular outer margin, terminating well short of pleotelson apex.

FEMALE

With the exception of sexual characters, as for male.

COLOUR

In life, dull brick red, without chromatophores.

ETYMOLOGY

The Maori name "kutu" is applied to this isopod for its association with seaweed; the hair strands of Hine moana.

Ko tenei Kutu moana e noho ana i roto te huruhuru o Hine moana; ko nga whenu o te rimurimu he ahua rite tonu ki nga tihi o te rakau pena ki te ahua aorangi me te taratara, engari whero te tae i nga wa katoa. Tino paraha te Kutu moana, na ka mau nga waewae piki e whitu o te kutu ki nga whenu o nga huruhuru o Hine moana ara ko nga rimurimu whero. Ka kaingia te kutu i nga kararehe iti o te moana e noho ana i kona hei whakama i nga rimurimu. Ka tiakina e nga rimurimu i nga kutu moana no nga ngaru me te hukahuka o te moana. Kei konei te wahi ka noho te Kutu me ona whanaunga, ko te Koura-iti, te Mawhitiwhiti me te Papaka huna; ko te katoa e noho nei i roto i te rimurimu whero.

Tangaroa

|

Uruao

|

Tahumaero

|

Te Koura - kutu moana

(Sources from oral information and undated typescript [Matorohanga MS, Ngati Kahungunu] translated by D.R. Simmons and M. Penfold, Auckland University.)

DISCUSSION

Scutuloidea kutu is the second described species of this endemic genus. It is immediately distinguishable from *S. maculata* by colour, the narrowly ovate body, and by the uropoda terminating well short of the pleotelson apex which is also lacking a terminal notch. In contrast *S. maculata* is a chestnut brown colour with an ovate body and the uropoda terminate level with the apex of the pleotelson which is large, triangular and has a wide, shallow apical notch. *S. kutu* has significantly smaller eyes (19% of head length, n=15) than *S. maculata* (38.5% of head length, n=15). Females are commonly carried by males within the space confined by the pereopods; this behaviour has also been noted in *S. maculata* by Hurley & Jansen (1977). That it is a position of amplexus (Poore 1981) is consistent with thickened, scaled, patches and glands on pereopods 3-5 in males.

Scutuloidea kutu can exist sympatrically with *S. maculata* and both species were recovered simultaneously during our investigation of seaweed epifaunas in the Bay of Islands (Stephenson & Riley 1995). However, *S. maculata* generally shows relatively low tolerance to wave action, a narrow vertical shoreline range predominantly between low water neap and spring (Jansen 1971), often abundantly associated with *Carpophyllum mascalocarpum* (Stephenson & Riley 1995) and other narrowly flat-bladed seaweeds such as *Plocamium costatum* and *Xiphophora chondrophylla*. By contrast, *S. kutu* has mostly been recovered subtidally in more exposed situations, and from filamentous red seaweeds *Plocamium costatum* and *Osmundaria colensoi*. It does not appear to occur in any habitat with the same high abundance that can exist for *S. maculata*.

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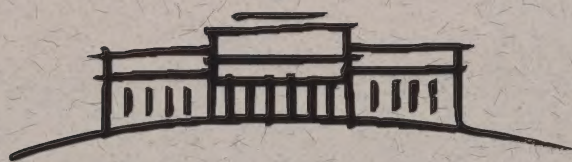
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